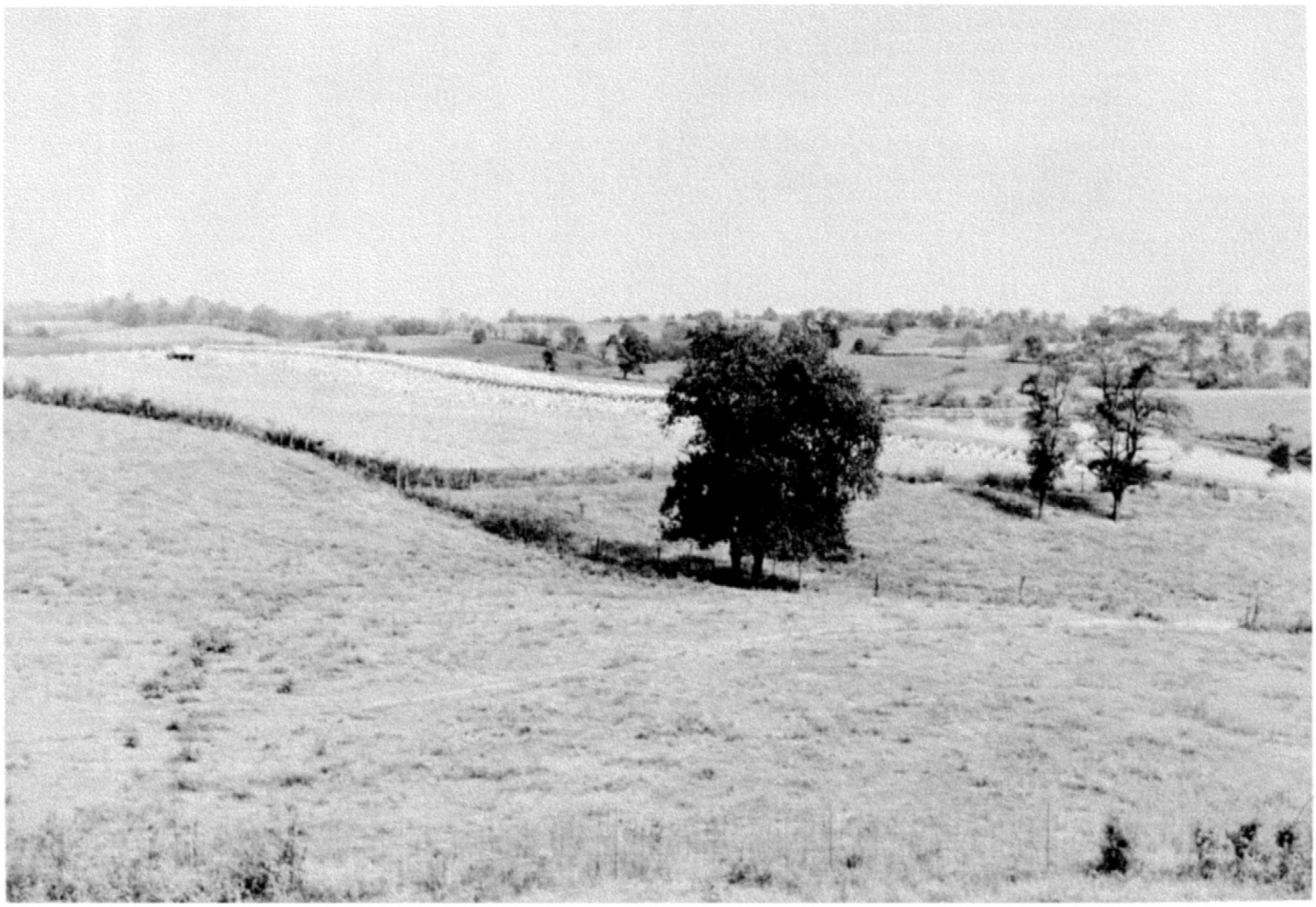
SOIL SURVEY OF

Madison County, Kentucky



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Kentucky Agricultural Experiment Station

Issued March 1973

Major fieldwork for this soil survey was done in the period 1964 to 1967. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1967. This survey was made cooperatively by the Soil Conservation Service and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Madison County Soil Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Madison County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by a symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit and woodland group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions, in the section on "Use of Soils for Crops and Pasture," and from the discussions of woodland suitability groups.

Foresters and others can refer to the section "Use of Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section, "Use of Soils for Wildlife."

Community planners and others concerned with town and country planning can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section, "Use of Soils for Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of Soils," tables that give physical and chemical properties of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Madison County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County."

***Cover picture.*—Landscape in the Shelbyville-Mercer-Nicholson soil association. Cultivated area in left-center is on Shelbyville silt loam, 2 to 6 percent slopes.**

U.S. GOVERNMENT PRINTING OFFICE: 1973

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

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SOIL SURVEY OF MADISON COUNTY, KENTUCKY

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE KENTUCKY AGRICULTURAL EXPERIMENT STATION

MADISON COUNTY is in the east-central part of Kentucky (fig. 1). It has an area of approximately 446 square miles, or 285,440 acres.

Madison County is primarily a farming area. Burley tobacco and beef cattle are the main farm products. The Outer Bluegrass is the major physiographic region. It is a rolling area in the central part of the county. The Hills of the Bluegrass is a hilly area in the northwestern and northeastern parts. The Mountain region extends from east to west across the southern part of the county. The Knobs region separates the Mountains from the Outer Bluegrass, and is a hilly area interrupted by a few broad flats.

The climate is temperate and favorable for many types of plants and animals.

Richmond, the county seat, and Berea are the urban centers. Both have a college and a few small industries.

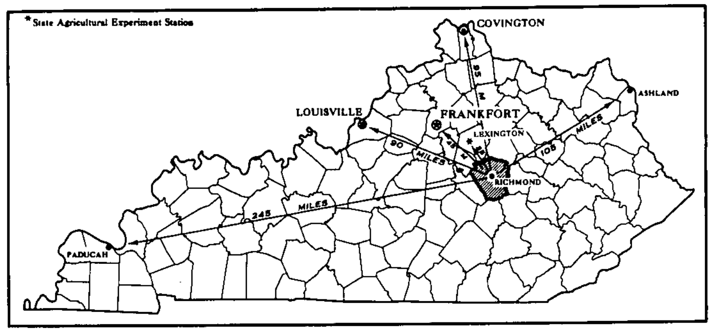

Figure 1.—**Location of Madison County in Kentucky.**

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Madison County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and velocity of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by weathering, by leaching, or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Berea and Shelbyville, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of the soil phase indicates a feature that affects management. For example, Mercer silt loam, 2 to 6 percent slopes, is one of several phases within the Mercer series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit is shown on the soil map of Madison County: soil complexes.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be

shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils joined by a hyphen. An example is Cynthiana-Rock outcrop complex, 12 to 30 percent slopes.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so highly variable in characteristics that it cannot be classified by soil series, or classifying it by series is impractical. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gullied land is a land type in Madison County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland and rangeland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Madison County, Kentucky. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is also useful in determining the value of the associations for growing wood products, for wildlife habitat, for engineering work, and for town and country planning. A general soil map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The six soil associations in Madison County are described in the paragraphs that follow.

1. Culleoka-Eden Association

Moderately deep, well-drained, gently sloping soils on narrow ridgetops and moderately deep and deep, well-drained, steep soils on side slopes

This association is in the northwestern part of the county and includes the Poosey Ridge, Baldwin, and Newby communities. It consists of long, narrow, winding ridgetops between steep, V-shaped valleys that are about 200 feet deep. The soils are underlain by calcareous siltstone and sandstone or by mixed siltstone, shale, and limestone.

This association makes up about 16 percent of the county. About 40 percent of this is Culleoka soils, 30 percent is Eden soils, and the remaining 30 percent is minor soils.

The Culleoka soils are on ridgetops and steep hillsides. They are moderately deep, well-drained, loamy soils that have many flagstones on the steep slopes. The Eden soils are dominantly on the lower half of the steep hillsides below the Culleoka soils, and, in the northern part of the association, they are on ridgetops and steep hillsides. They are deep, well-drained, clayey soils. The steep slopes are flaggy.

The minor soils are Huntington, Shelbyville, and Elk soils on flood plains of Paint Lick Creek, Silver Creek, Tate Creek and the Kentucky River, and the McAfee and Mercer soils on ridgetops.

Areas used for row crops in this association are mostly on ridgetops and on flood plains along the streams. Steep side slopes are used mostly for pasture. Slopes that are too steep for the use of modern machinery are in woods or are reverting to woods.

2. Lowell-Faywood-Cynthiana-Rock Outcrop Association

Deep, well-drained, gently sloping soils on fairly wide ridgetops and moderately deep and shallow, sloping to steep soils on side slopes

This association extends in an irregular pattern from the Kentucky River at the northern boundary of the county, across the central and southwestern parts of the county, to the Garrard County line. The largest part is a wide area extending from the north side of Richmond to the Kentucky River.

The association consists of rather wide ridgetops dissected by strongly sloping and steep drainageways (fig. 2). The soils are underlain by limestone, and small sinkholes and depressions are common in some places.

This association makes up about 33 percent of the county. About 21 percent of this is Lowell soils, 17 percent is Faywod soils, 16 percent is Cynthiana-Rock outcrop complex, and the remaining 46 percent is minor soils.

The Lowell soils are on ridgetops and, to a small extent, in strongly sloping areas along drainageways. They are deep, well-drained soils that have a silt loam plow layer and a clayey subsoil. The Faywood soils are on the narrower ridgetops and in strongly sloping and steep areas along drainageways. They are moderately deep, well-drained soils that have a silt loam plow layer and a clayey subsoil. The Cynthiana soils are shallow, well drained, and clayey; they occur with outcrops of limestone rock that make up about 40 percent of the surface area. Cynthiana

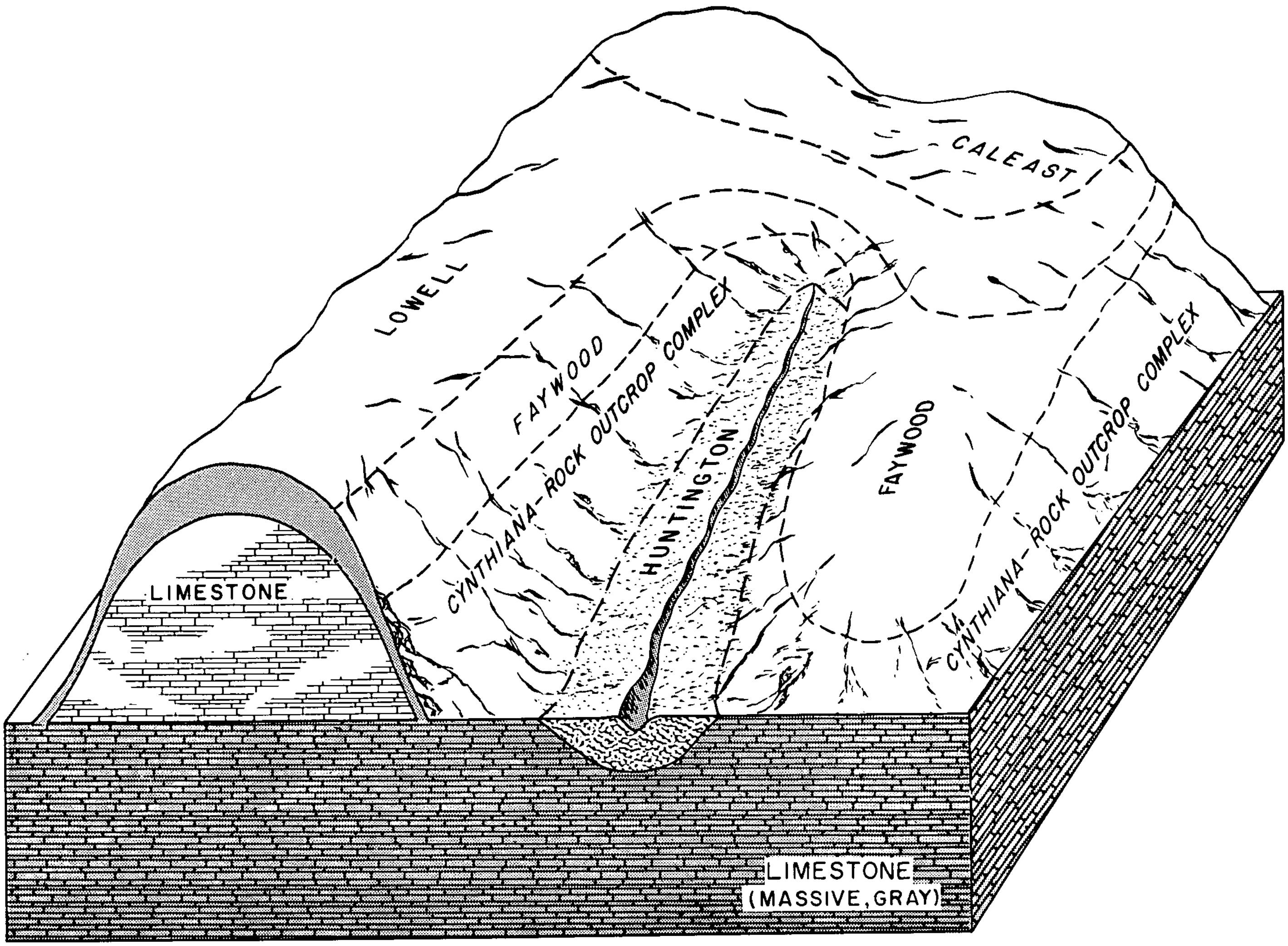

Figure 2.—**Relationship of soils to topography and underlying material in the Lowell-Faywood-Cynthiana-Rock outcrop association.**

soils are strongly sloping or moderately steep on side slopes along drainageways.

The minor soils are Huntington, Lindside, and Newark soils on the flood plains; Mercer and Shelbyville soils on ridgetops and stream terraces; Caleast, Hagerstown, McAfee, and Nicholson soils on ridgetops; and Fairmount-Rock outcrop complex on hillsides. The Caleast and Fairmount-Rock outcrop complex are the most extensive of the minor soils.

Growing tobacco and raising beef cattle are the main farm enterprises. Most of this association is used mainly for pasture and hay production. Tobacco is grown mostly on the smoother ridgetops. Corn for grain or silage is grown in a long rotation on some hill land, and intensively on some bottom land. Much of the better land in this association has a potential for more intensive use.

3. Beasley-Brassfield-Otway Association

Deep, well-drained, gently sloping to sloping soils on narrow ridgetops and moderately deep, well-drained, strongly sloping to steep soils on side slopes

This association consists of one large area and three small areas. The largest area is in the northeastern part of the county and extends southward in a narrow pattern along the eastern boundary of the county. Doylesville is centrally located in the northern part of this area. The three smaller areas are in the southern part of the county.

The association consists of long narrow ridgetops between steep, long, V-shaped valleys that are from 150 to 200 feet deep. The soils are underlain by marl.

This association makes up about 18 percent of the county. About 28 percent of this is Beasley soils, 28 percent is Brassfield soils, 20 percent is Otway soils, and the remaining 24 percent is minor soils.

The Beasley soils are on ridgetops and, to a lesser extent, are strongly sloping on upper ends of drainageways. They are well-drained soils that have a silty plow layer and a clayey subsoil, which is underlain by marl at a depth of about 34 inches. The Brassfield soils are strongly sloping to steep on side slopes and, to a minor extent, are sloping on very narrow ridgetops. They are loamy soils that consist of about 12 percent siltstone and sandstone fragments and are underlain by marl at a depth of about 18 inches. The Otway soils are strongly sloping to steep on side slopes and, to a minor extent, are sloping on very narrow ridge-

tops. They have a dark-colored silty clay plow layer and a silty clay loam subsoil that is underlain by marl at a depth of about 29 inches.

The minor soils are Woolper, Egam, Huntington, Boonesboro, and Elk soils along or on the flood plains, and Shrouts and Fairmount soils on the side slopes. In addition, Captina and Tate are minor soils on the ridgetops.

Row crops, tobacco, and corn are grown mostly on ridgetops and on flood plains, which comprise a small percentage of the total acreage in the association. Much of the pasture on the steep side slopes is low quality, and many areas are reverting to redcedar and brush.

4. Shelbyville-Mercer-Nicholson Association

Deep, well drained to moderately well drained, level to gently sloping soils on wide ridgetops and deep, well drained to moderately well drained, sloping soils along drainageways

This association is in the central part of the county; the town of Terrill is at the approximate center. The association (fig. 3) consists of wide ridgetops dissected by small drainageways. The soils are underlain by limestone.

This association makes up about 9 percent of the county. About 31 percent of this is Shelbyville soils, 31 percent is Mercer soils, 15 percent is Nicholson soils, and the remaining 23 percent is minor soils.

The Shelbyville soils are gently sloping to level on ridgetops and sloping along drainageways. They are deep, well-drained, silty soils. The Mercer soils are level to gently sloping on ridgetops and sloping along drainageways. They are moderately well drained soils that have a firm compact fragipan at a depth of about 22 inches. The Nicholson soils are gently sloping on ridgetops and sloping along drainageways. They are moderately well drained to well drained soils that have a fragipan at a depth of about 30 inches.

The minor soils are Lowell and Faywood soils on the narrower ridgetops and strongly sloping side slopes along the deeper drainageways, and Caleast soils on ridgetops and in sloping areas along drainageways.

Growing tobacco and raising beef cattle are the main farm enterprises. Because of the small percentage of steep soils, most of this association is suited to an intensive type of cropping system. Many areas, however, are used mostly for pasture.

5. Lawrence-Mercer-Robertsville Association

Somewhat poorly drained and poorly drained soils on broad flats; moderately well drained, level to gently sloping soils on wide ridgetops; and moderately well drained, sloping soils along drainageways

This association consists of two areas. The larger area is in the east-central part of the county, and the town of Moberly is at the approximate center. The smaller area is in the southern part of the county near Berea. The landscape (fig. 4) consists of broad flats and wide ridgetops that are dissected by short drainageways.

This association makes up about 10 percent of the county. About 36 percent of this is Lawrence soils, 32 percent is Mercer soils, 9 percent is Robertsville soils, and the remaining 23 percent is minor soils.

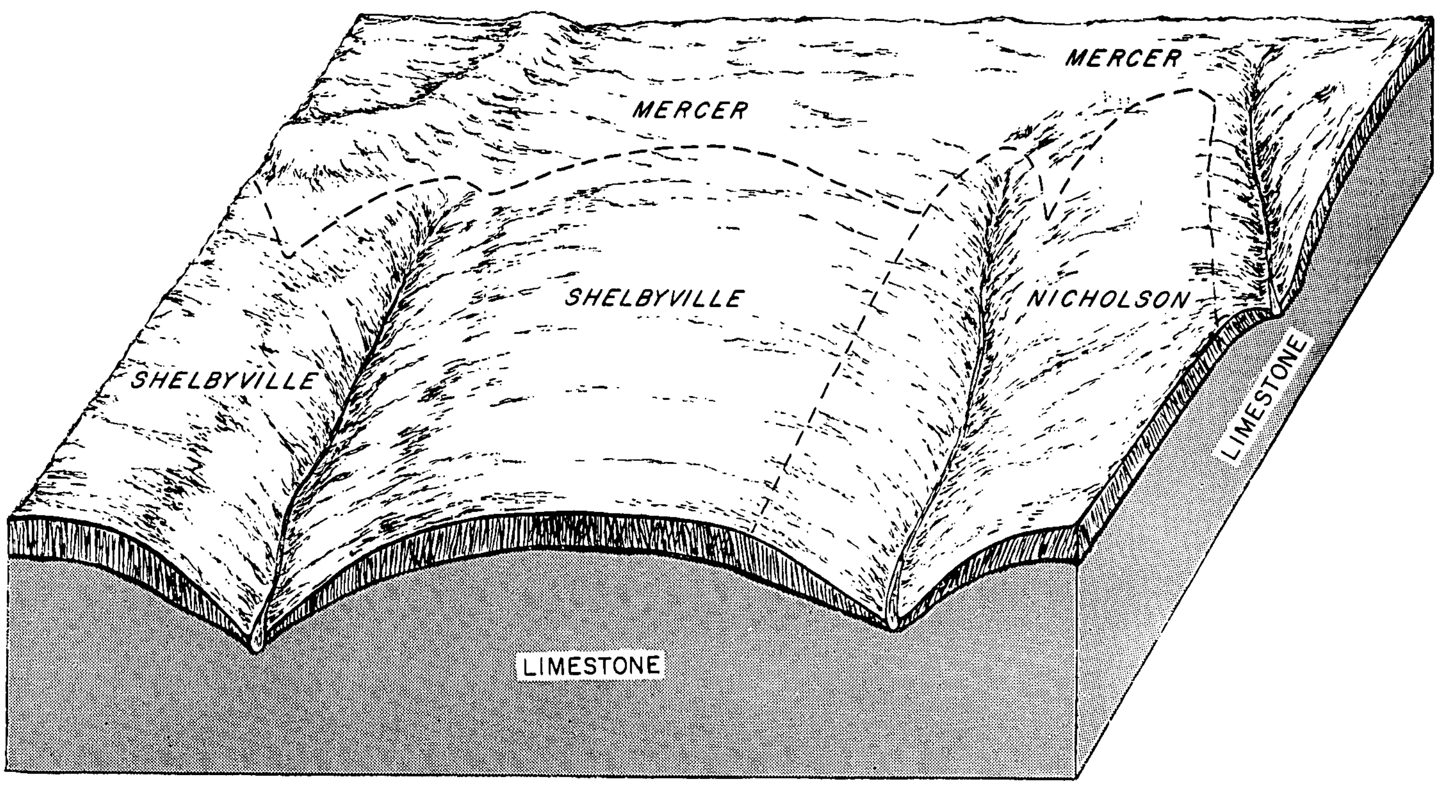

Figure 3.—**Relationship of soils to topography and underlying material in the Shelbyville-Mercer-Nicholson association.**

The nearly level Lawrence soils are on broad flats and wide ridgetops. They are somewhat poorly drained, loamy soils that have a firm compact fragipan at a depth of about 18 inches. The Mercer soils are nearly level and gently sloping on ridgetops and are sloping along drainageways. They are moderately well drained, loamy soils that have a fragipan at a depth of about 22 inches. The Robertsville soils are in depressions on the broad flats. They are poorly drained soils that have a fragipan at a depth of about 15 inches.

The minor soils are Newark and Dunning soils on flood plains, and Beasley, Shelbyville, Captina, Monongahela, and Tate soils on ridgetops and side slopes. Monongahela and Tate are sandy soils that formed in river alluvium.

Most of the soils in this association have a wetness limitation. Some rather large areas in the Berea section have been successfully tile drained. These areas are used intensively for corn and hay crops. Other areas are used mostly for pasture. The small areas of better drained soils scattered throughout the association are used mostly for tobacco. Tobacco and beef cattle are the main farm enterprises in this association.

6. Colyer-Weikert-Captina Association

Shallow, steep soils on mountain sides and on side slopes of knobs and moderately well drained, level to sloping soils along flood plains

This association is in the Mountain and Knobs sections of the county, extending along the entire southern border. The long, steep mountains rise about 500 feet above the rather narrow, more nearly level areas along the flood plains of the streams (fig. 5). Most of the soils are underlain by acid shale or siltstone.

This association makes up about 14 percent of the county. About 20 percent of this is Colyer soils, 17 percent is Weikert soils, 13 percent is Captina soils, and the remaining 50 percent is minor soils.

The Colyer soils are mostly on lower hillsides and knobs just north of the mountains. They are shallow soils over black shale. The steep Weikert soils are on the lower half of the mountain slopes in the western part of the county, but they extend to the top of the lower mountains in the eastern part. They are shallow, loamy soils in which about 35 percent of the volume is coarse siltstone fragments. The Captina soils are in colluvial areas and on ridgetops and stream terraces. They are moderately well drained, loamy soils that have a compact fragipan at a depth of about 20 inches.

The minor soils are Huntington, Lindside, Newark, Melvin, Lawrence, and Robertsville soils on and along the flood plains; Cynthiana and Whitley soils on the mountain ridgetops; and Shelocta, Rarden, and Rockcastle soils on the toe slopes of the mountains. In addition, Berea soils are on ridgetops and in sloping areas along drainageways. The Caneyville soils are on the upper half of the higher mountainsides in the eastern part of the association.

Most of this association consisting of mountain slopes is in woods. The areas along stream flood plains are used for tobacco, corn, hay, and pasture.

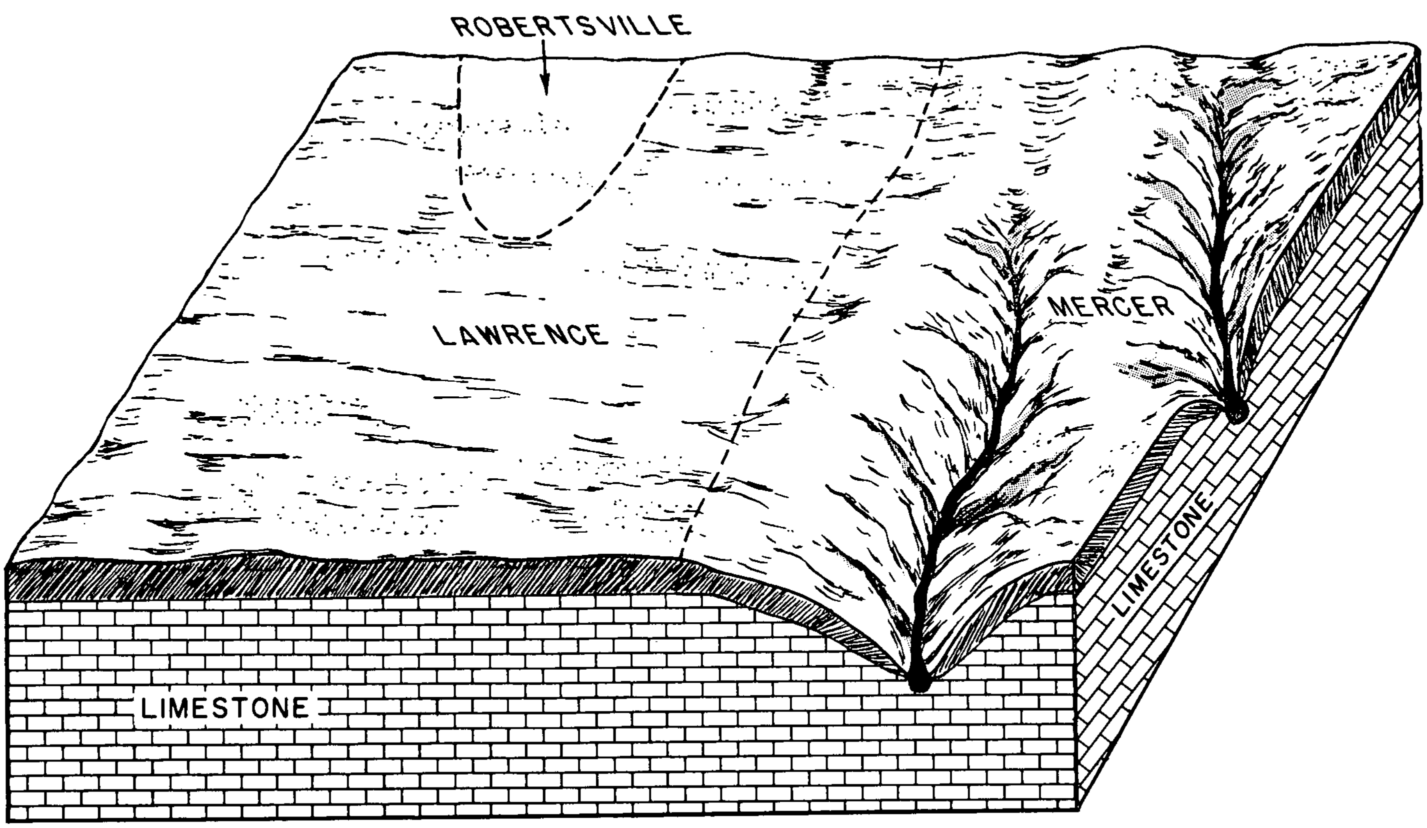

Figure 4.—Relationship of soils to topography and underlying material in the Lawrence-Mercer-Robertsville association.

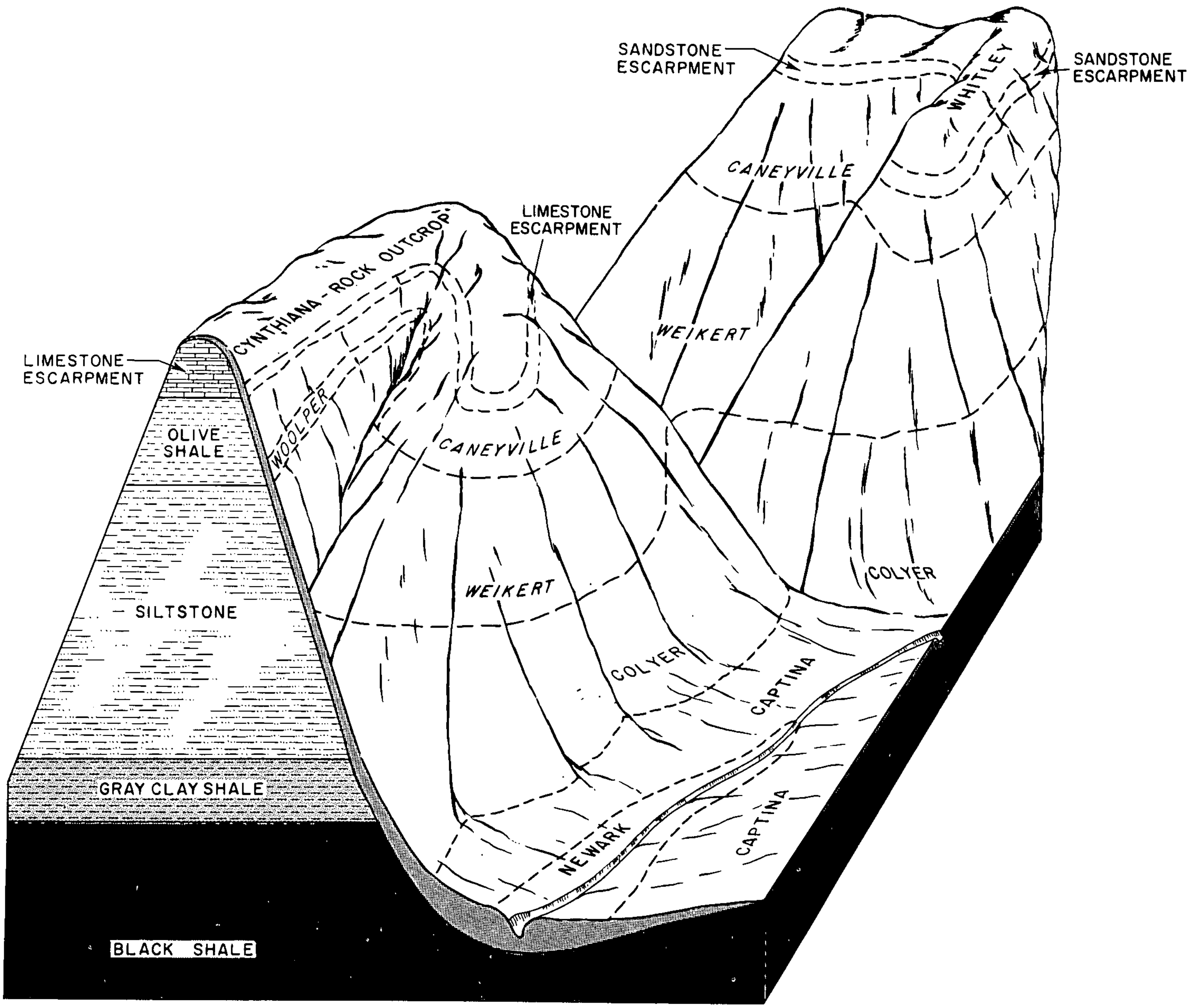

Figure 5.—**Relationship of soils to topography and underlying material in the Colyer-Weikert-Captina association.**

Descriptions of the Soils

In this section the soil series and the mapping units in each series are described. The description of a soil series mentions the features that apply to all the mapping units in that series. Each series contains a short description of a typical soil profile and a much more detailed description of the same profile that scientists, engineers, and others can use in making highly technical interpretations. Differences among the mapping units of one series are pointed out in the descriptions of the individual mapping units or are indicated in the names of the mapping units. Unless otherwise stated, the profile described for the principal mapping unit is considered representative for all mapping units in the series.

A symbol in parentheses follows the name of each mapping unit. This symbol identifies the mapping unit on the detailed soil map, which is at the back of the survey. Listed at the end of each description is the capability unit and woodland suitability group assigned to the mapping unit.

For more generalized information about soils in the area surveyed, the reader can refer to the section "General Soil Map." The approximate acreage and proportionate extent of the mapping units are given in table 1, and a list of the units mapped, along with the capability unit and woodland group of each, is given in the "Guide to Mapping Units" at the back of the survey. Many terms used in describing the soils are defined in the Glossary and the "Soil Survey Manual" (*16*).[1]

[1] Italic numbers in parentheses refer to Literature Cited, p. 99.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Alluvial land, steep	190	0. 1
Beasley silt loam, 2 to 6 percent slopes	2, 080	. 7
Beasley silt loam, 6 to 12 percent slopes	6, 480	2. 3
Beasley silt loam, 12 to 20 percent slopes	2, 020	. 7
Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	2, 060	. 7
Beasley silty clay loam, 12 to 20 percent slopes, severely eroded	1, 500	. 5
Berea silt loam, 0 to 2 percent slopes	440	. 2
Berea silt loam, 2 to 6 percent slopes	3, 120	1. 1
Berea silt loam, 6 to 12 percent slopes	760	. 3
Blago silt loam	630	. 2
Boonesboro silt loam	1, 000	. 4
Brassfield silt loam, 6 to 12 percent slopes	1, 520	. 5
Brassfield silt loam, 12 to 30 percent slopes	10, 500	3. 7
Brassfield silt loam, 30 to 50 percent slopes	2, 330	. 8
Caleast silt loam, 2 to 6 percent slopes	4, 830	1. 7
Caleast silt loam, 6 to 12 percent slopes	6, 020	2. 1
Caneyville very stony silt loam, 35 to 60 percent slopes	2, 630	. 9
Captina silt loam, 0 to 2 percent slopes	1, 030	. 4
Captina silt loam, 2 to 6 percent slopes	1, 980	. 7
Captina silt loam, 6 to 12 percent slopes	1, 690	. 6
Captina silt loam, 6 to 12 percent slopes, severely eroded	330	. 1
Colyer shaly silt loam, 12 to 50 percent slopes	3, 730	1. 3
Colyer shaly silty clay loam, 12 to 50 percent slopes, severely eroded	4, 540	1. 6
Culleoka silt loam, 2 to 6 percent slopes	1, 130	. 4
Culleoka silt loam, 6 to 12 percent slopes	2, 930	1. 0
Culleoka silt loam, 12 to 20 percent slopes	1, 600	. 6
Culleoka flaggy silt loam, 20 to 30 percent slopes	7, 760	2. 7
Culleoka flaggy silt loam, 30 to 50 percent slopes	8, 060	2. 8
Cynthiana-Rock outcrop complex, 12 to 30 percent slopes	16, 370	5. 7
Dunning silty clay loam	1, 260	. 4
Eden silty clay loam, 6 to 20 percent slopes, eroded	2, 130	. 7
Eden flaggy clay, 20 to 30 percent slopes, eroded	7, 050	2. 5
Eden flaggy clay, 30 to 50 percent slopes, eroded	7, 020	2. 5
Egam silty clay loam	480	. 2
Elk silt loam, 0 to 2 percent slopes	510	. 2
Elk silt loam, 2 to 6 percent slopes	1, 820	. 6
Elk silt loam, 6 to 12 percent slopes	1, 600	. 6
Elk silt loam, 12 to 20 percent slopes	350	. 1
Fairmount-Rock outcrop complex, 30 to 60 percent slopes	9, 220	3. 2
Faywood silt loam, 6 to 12 percent slopes	3, 720	1. 3
Faywood silt loam, 12 to 30 percent slopes	13, 580	4. 8
Gullied land	370	. 1
Hagerstown silt loam, 2 to 6 percent slopes	720	. 3
Hagerstown silt loam, 6 to 12 percent slopes	1, 160	. 4
Huntington silt loam	4, 470	1. 6
Kickapoo fine sandy loam	300	. 1
Lawrence silt loam	11, 700	4. 1
Lindside silt loam	2, 850	1. 0
Lowell silt loam, 2 to 6 percent slopes	1, 970	. 7
Lowell silt loam, 6 to 12 percent slopes	15, 030	5. 3
Lowell silt loam, 12 to 20 percent slopes	6, 590	2. 3
Lowell silty clay loam, 12 to 30 percent slopes, severely eroded	1, 500	. 5
McAfee silt loam, 6 to 12 percent slopes	730	. 3
McAfee silt loam, 12 to 20 percent slopes	1, 700	. 6
Melvin silt loam	560	. 2
Mercer silt loam, 0 to 2 percent slopes	1, 510	. 5
Mercer silt loam, 2 to 6 percent slopes	10, 130	3. 6
Mercer silt loam, 6 to 12 percent slopes	6, 940	2. 4
Mercer silty clay loam, 6 to 12 percent slopes, severely eroded	310	. 1
Monongahela fine sandy loam, 0 to 2 percent slopes	360	. 1
Monongahela fine sandy loam, 2 to 6 percent slopes	690	. 2
Monongahela fine sandy loam, 6 to 12 percent slopes	700	. 2
Newark silt loam	3, 630	1. 3
Nicholson silt loam, 2 to 6 percent slopes	2, 930	1. 0
Nicholson silt loam, 6 to 12 percent slopes	2, 580	. 9
Otway silty clay, 6 to 12 percent slopes	1, 440	. 5
Otway silty clay, 12 to 30 percent slopes	6, 330	2. 2
Otway silty clay, 30 to 50 percent slopes	2, 990	1. 0
Rarden silt loam, 6 to 12 percent slopes	310	. 1
Rarden silt loam, 12 to 20 percent slopes, eroded	440	. 2
Robertsville silt loam	3, 410	1. 2
Rockcastle silt loam, 6 to 12 percent slopes	170	. 1
Rockcastle silt loam, 12 to 20 percent slopes	300	. 1
Rockcastle silt loam, 20 to 30 percent slopes	2, 200	. 8
Rock outcrop-Opequon complex, 12 to 30 percent slopes	950	. 3
Rock outcrop, shale	250	. 1
Shelbyville silt loam, 0 to 2 percent slopes	1, 160	. 4
Shelbyville silt loam, 2 to 6 percent slopes	7, 270	2. 5
Shelbyville silt loam, 6 to 12 percent slopes	4, 160	1. 5
Shelocta gravelly silt loam, 12 to 25 percent slopes	1, 660	. 6
Shrouts silty clay loam, 6 to 12 percent slopes	210	. 1
Shrouts silty clay loam, 12 to 30 percent slopes	3, 890	1. 4
Shrouts clay, 6 to 30 percent slopes, severely eroded	2, 990	1. 0
Tate fine sandy loam, 2 to 6 percent slopes	230	. 1
Tate fine sandy loam, 6 to 12 percent slopes	1, 160	. 4
Tate fine sandy loam, 12 to 20 percent slopes, eroded	2, 690	. 9
Trappist silt loam, 2 to 6 percent slopes	920	. 3
Trappist silt loam, 6 to 12 percent slopes	1, 710	. 6
Trappist silt loam, 12 to 20 percent slopes	300	. 1
Trappist silty clay loam, 6 to 12 percent slopes, severely eroded	390	. 1
Weikert channery silt loam, 40 to 80 percent slopes	6, 860	2. 4
Whitley silt loam, 2 to 6 percent slopes	550	. 2
Whitley silt loam, 6 to 12 percent slopes	1, 110	. 4
Whitley silt loam, 12 to 20 percent slopes	210	. 1
Woolper silty clay loam, 2 to 6 percent slopes	490	. 2
Woolper silty clay loam, 6 to 12 percent slopes	880	. 3
Woolper very stony silty clay loam, 12 to 30 percent slopes	380	. 1
Total	285, 440	100. 0

Alluvial Land, Steep

Alluvial land, steep (AlF) consists of soils formed in alluvium on the riverbank along the Kentucky River and, to a minor extent, in the escarpment areas of the flood plain. These soils vary in characteristics from place to place. They consist mostly of stratified layers that are quite variable in content of sand, silt, and clay and have no uniform pattern of sequence. Slopes range from 12 to 40 percent in most places but range from 6 to 12 percent in a few areas. Most areas are flooded several times annually.

Most areas are in trees, but some of the less steep areas are used for crops or pasture and hay. (Capability unit VIe–1; woodland suitability group 13)

Beasley Series

The Beasley series consists of well-drained soils that formed in residuum from marl. These soils are on narrow, high ridgetops and upper side slopes between deep, V-shaped valleys, mostly in the northeastern part of the county.

In a typical profile the surface layer is dark grayish-brown silt loam about 10 inches thick. The subsoil, to a depth of about 29 inches, is yellowish brown and is mainly silty clay or clay. Below the subsoil, to a depth of 34 inches, is olive-brown, plastic clay. It is underlain by soft shale and marl to a depth of 48 inches or more.

The Bealsey soils have moderate natural fertility and are medium acid in the surface layer and subsoil. Permeability is moderately slow to slow.

Typical profile of a Beasley silt loam (one-fourth mile north of State Route 595 on gravel road, 1 mile northwest of Middletown):

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; many roots; medium acid; clear, smooth boundary.

B1t—10 to 16 inches, yellowish-brown (10YR 5/5) silty clay loam; few, fine, distinct variegations of yellowish red (5YR 5/6); moderate, medium, blocky structure; firm, slightly sticky; common roots; few clay films, few, small, black concretions; medium acid; gradual, smooth boundary.

B2t—16 to 29 inches, yellowish-brown (10YR 5/6) silty clay or clay; common, medium, distinct variegations of yellowish red (5YR 5/6); moderate, medium, blocky structure; very firm, sticky and plastic; few roots; common clay films; common, small and medium, black concretions; medium acid; clear, smooth boundary.

C1—29 to 34 inches, olive-brown (2.5Y 4/4) clay; massive; very firm, sticky and plastic; slightly acid; clear, smooth boundary.

IIC2—24 to 48 inches +, light yellowish-brown (2.5Y 6/4) soft shale or marl; common, medium, faint variegations of gray (5Y 6/1); crushes to a loam; platy; calcareous.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock ranges from 4 to 6 feet. Except in severely eroded areas, the Ap horizon is dark grayish brown (10YR 4/2), brown (10YR 4/3), or grayish brown (10YR 5/2). It is yellowish-brown silty clay loam in severely eroded areas. The B horizon is strong brown (7.5YR 5/6) or yellowish brown (10YR 5/4 or 5/6). The B1t horizon is missing in some places.

The Beasley soils occur with Otway and Brassfield soils on side slopes of steep, V-shaped valleys. Beasley soils have a less dark surface layer and a thicker solum than the alkaline Otway soils, and they have a thinner solum than the calcareous Brassfield soils.

Beasley silt loam, 2 to 6 percent slopes (BaB).—This soil is on convex, long, narrow ridgetops. A few areas have small sinks or depressions that are slightly wet at times. A profile of this soil is described as typical for the series.

The available moisture capacity is high, and organic-matter content is low. The root zone is slightly restricted at a depth of more than 30 inches. Plants respond well to lime and fertilizer. This soil is easily tilled.

Most areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–2; woodland suitability group 2)

Beasley silt loam, 6 to 12 percent slopes (BaC).—This soil is on convex, long, narrow ridgetops and upper side slopes of valleys. Its profile differs from the one described as typical for the series in that the surface layer is about 6 inches thick and is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are some small, severely eroded areas. They are noticeable as yellowish spots where a field is plowed.

The available moisture capacity is moderate, and organic-matter content is low. The root zone is slightly restricted at a depth below 28 inches. Plants respond well to lime and fertilizer. This soil is easily tilled.

Most areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is severe where row crops are grown (Capability unit IIIe–2; woodland suitability group 2)

Beasley silt loam, 12 to 20 percent slopes (BaD).—This soil is on side slopes at the heads of valleys. Its profile differs from the one described as typical for the series in that the surface layer is about 6 inches thick and is a mixture of subsoil material and the original surface layer. Depth to the underlying marl layer is about 28 inches.

Included with this soil in mapping are a few small, severely eroded areas, and a few small areas of Otway and Brassfield soils.

The available moisture capacity is only moderate because the root zone is restricted below a depth of 24 inches. Plants respond well to lime and fertilizer. Organic-matter content is low, but this soil is easily tilled.

Most areas have been used for crops and pasture but are now used mostly for hay and pasture. A few small areas remain wooded. The erosion hazard is very severe where row crops are grown. (Capability unit IVe–2; woodland suitability group 2)

Beasley silty clay loam, 6 to 12 percent slopes, severely eroded (BcC3).—This soil is on convex, long, narrow ridgetops and at heads of valleys. Its profile differs from the one described as typical for the series in that the surface layer is yellowish-brown, firm silty clay loam that consists entirely or mostly of subsoil material that has been exposed by erosion. Depth to the underlying marl is about 20 inches.

Included with this soil in mapping are a few small areas that are not severely eroded. They show up as darker spots where fields are plowed.

The available moisture capacity is only moderate because the root zone is restricted below a depth of 20 inches. Plants respond fairly well to lime and fertilizer. It is often difficult to get good stands of pasture or crops. Common small gullies, low organic-matter content, and high clay content in the surface layer make tillage difficult.

Most areas have been used for crops, but because the hazard of erosion is very severe where row crops are grown, most areas are now used for pasture. (Capability unit IVe–5; woodland suitability group 3)

Beasley silty clay loam, 12 to 20 percent slopes, severely eroded (BcD3).—This soil is on upper side slopes at heads of valleys. Its profile differs from the one described as typical of the series in that the surface layer is firm, yellowish-brown silty clay loam that is about 5 inches thick and consists entirely or mostly of subsoil material that has been exposed by erosion. Depth to the underlying marl is about 20 inches.

Included with this soil in mapping are some small areas of Brassfield soils and a few small areas that have a surface layer that is a mixture of subsoil material and the original surface layer.

The available moisture capacity is low to moderate because the root zone is restricted below a depth of 20 inches. Common small gullies, low organic-matter content, and high clay content in the surface layer make tillage difficult. It is also difficult to get good stands of grass and legumes. Plants respond fairly well to lime and fertilizer.

Most areas have been used for crops and pasture but are now used mainly for pasture. Some areas are reverting to woods or growing up in brush. This soil is not suited to row crops. (Capability unit VIe–2; woodland suitability group 3)

Berea Series

The Berea series consists of moderately well drained soils that formed in residuum from black shale. These soils are nearly level to sloping and are on ridgetops between deep valleys in the Knobs section.

In a typical profile the surface layer is brown silt loam about 6 inches thick. The subsoil is silty clay loam that is yellowish brown in the upper part and gray in the lower part. Below this, at a depth of about 28 inches, is gray silty clay. Hard, black shale is at a depth of about 31 inches.

The Berea soils are very strongly acid and are low in natural fertility. Permeability is moderate to a depth of about 28 inches and is slow below this depth.

Typical profile of a Berea silt loam (270 yards south of State Route 21 on the west side of the Berea-Interstate Highway No. 75 interchange):

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, very fine, subangular blocky and weak, fine, granular structure; very friable; many roots; medium acid; clear, smooth boundary.

B21t—6 to 17 inches, yellowish-brown (10YR 5/6) light silty clay loam; weak, fine and medium, angular blocky structure; friable; common roots; common clay films; very strongly acid; clear, smooth boundary.

B22t—17 to 21 inches, yellowish-brown (10YR 5/6) light silty clay loam; common, medium, faint mottles of light yellowish brown (10YR 6/4), strong brown (7.5YR 5/6), and light brownish gray (2.5Y 6/2); weak, fine and medium, angular blocky structure; firm; common roots; common clay films; 10 percent strong-brown, highly weathered shale fragments; very strongly acid; clear, wavy boundary.

B3t—21 to 28 inches, gray (10YR 6/1) light silty clay loam; common, medium, faint mottles of light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6); weak, medium and coarse, angular blocky structure; firm; few roots; common clay films; 15 percent yellowish-brown, yellowish-red, and black shale fragments; very strongly acid; clear, smooth boundary.

IIC—28 to 31 inches, gray (10YR 6/1) silty clay; common, medium, distinct mottles of yellowish brown (10YR 5/6); platy; very firm, sticky and plastic; 60 percent shale fragments, mostly yellowish red, yellowish brown, and black on broken surfaces, but coated with gray silty clay; very strongly acid; abrupt, smooth boundary.

R—31 inches +, black (10YR 2/1) on broken surfaces, fissile, bituminous shale; some streaks of strong brown; mostly grayish brown (10YR 5/2) coats on outside of fragments.

The solum ranges from 18 to 36 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. The Ap horizon has a hue of 10YR or 2.5Y, a value of 4 or 5, and a chroma ranging from 2 to 4. The A1 horizon has a hue of 10YR or 2.5Y, a value ranging from 2 to 4, and a chroma of 1 or 2. In undisturbed areas the A1 horizon is less than 3 inches thick. The A2 horizon has colors like those in the Ap horizon. It ranges from 3 to 8 inches in thickness. The B2t horizon is 27 to 35 percent clay and is less than 15 percent sand coarser than very fine sand, plus shale fragments. The A and B2 horizons range from 1 to about 10 percent shale fragments in some places. Reaction is strongly acid to extremely acid unless the soil has been limed. The B2 horizon has a hue of 10YR or 2.5Y, a value ranging from 4 to 6, and a chroma ranging from 4 to 6. Mottles that have a chroma of 2 or less begin at depths of 8 to 20 inches below the top of the B horizon. In some places the B3t horizon has a matrix color of yellowish brown or olive brown with gray mottles; in other places the horizon is evenly mottled without a matrix color. The B3t horizon has a clay content that ranges from about 27 to 40 percent.

The Berea soils occur with Colyer, Trappist, and Lawrence soils. They are deeper and less well drained than Colyer soils. They are less well drained and less red in the B horizon than Trappist soils. Berea soils are better drained than Lawrence soils and do not have gray mottles in the upper part of the B horizon.

Berea silt loam, 0 to 2 percent slopes (BeA).—This soil is on wide ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small, scattered areas of somewhat poorly drained soils and a few small areas where bedrock is at a depth of more than 40 inches.

The available moisture capacity is only moderate because the root zone is restricted by a clayey layer at a depth of about 28 inches. Permeability of the lower subsoil is slow and so is surface runoff. This results in a moderate wetness limitation during rainy periods. A seasonal high water table is at a depth of about 1 foot. Crops respond well to lime and fertilizer. The organic-matter content is low, but tillage is easy.

Most areas of this soil are used for crops and pasture. This soil is suited to most commonly grown crops, but tobacco and alfalfa may be damaged by wetness. (Capability unit IIw–1; woodland suitability group 8)

Berea silt loam, 2 to 6 percent slopes (BeB).—This soil is on convex, wide to narrow, long ridgetops.

Included with this soil in mapping are a few areas that have a surface layer that is a mixture of subsoil material and the original surface layer.

The available moisture capacity is only moderate because the root zone is restricted at a depth of about 28 inches. Plants respond well to lime and fertilizer. Organic-matter content is low, but tillage is easy.

Most areas are used for crops and pasture. This soil is suited to most commonly grown crops, but the erosion hazard is moderate where row crops are grown. Tobacco

and alfalfa may be damaged by wetness. (Capability unit IIe–3; woodland suitability group 8)

Berea silt loam, 6 to 12 percent slopes (BeC).—This soil is on convex ridgetops and along drainageways that dissect wide ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is a mixture of subsoil material and the original surface layer, and bedrock is at a slightly shallower depth.

Included with this soil in mapping are a few areas that have a plow layer that is mostly the original surface layer. Also included are a few small, scattered areas that are severely eroded and a few small areas that have slopes of 12 to 20 percent.

The available moisture capacity is only moderate because the root zone is restricted at a depth of about 25 inches. Plants respond well to lime and fertilizer. The organic-matter content is low, but tillage is easy.

Most areas are used for crops and pasture. This soil is suited to most commonly grown crops, but the erosion hazard is severe where row crops are grown. Tobacco and alfalfa may be damaged because the root zone is restricted. (Capability unit IIIe–3; woodland suitability group 8)

Blago Series

The Blago series consists of poorly drained to very poorly drained soils that have a thick, very dark colored surface layer. These soils are nearly level and occur in broad depressions of the Knobs section in the vicinity of Berea.

In a typical profile the surface layer is black silt loam about 18 inches thick. The subsoil, to a depth of about 24 inches, is grayish-brown silty clay mottled with shades of brown. Below this, the subsoil is gray, very firm, sticky clay that has brown and yellowish mottles. It extends to a depth of about 40 inches and is underlain by gray clay that is mottled with reddish yellow and yellowish brown. Black shale is at a depth of 54 inches.

These soils are very strongly acid and have a slow permeability.

Typical profile of Blago silt loam (100 yards north of the Berea College dairy barn):

Ap—0 to 6 inches, black (10YR 2/1) heavy silt loam; moderate, medium, granular structure; very friable; many roots; very strongly acid; gradual, smooth boundary.

A1—6 to 18 inches, black (10YR 2/1) heavy silt loam; weak, fine and medium, blocky structure; friable; common roots; strongly acid; abrupt, wavy boundary.

B1g—18 to 24 inches, grayish-brown (2.5Y 5/2) silty clay; common, medium, distinct mottles of yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6); weak, medium, blocky structure; firm, sticky and plastic; few roots; very strongly acid; gradual, wavy boundary.

B2tg—24 to 40 inches, gray (N 6/0) clay; many, coarse, prominent mottles of reddish yellow (7.5YR 6/8) and yellowish brown (10YR 5/8); weak, medium, blocky structure; very firm, sticky and plastic; noticeable clay films; very strongly acid; gradual, wavy boundary.

Cg—40 to 54 inches, gray (N 6/0) clay; many, coarse, prominent mottles of reddish yellow (7.5YR 6/8) and yellowish brown (10YR 5/8); massive; very firm, sticky and plastic; very strongly acid.

R—54 inches +, black shale.

The solum ranges from 30 to 50 inches in thickness and the depth to bedrock ranges from 4 to 8 feet or more. The A horizon ranges from 12 to 24 inches in thickness and is black (10YR 2/1), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2). The B1g horizon is grayish brown (2.5Y 5/2) or gray (N 5/0). It is mainly silty clay, but it ranges to silty clay loam in some places. The B2tg and C horizons are gray (N 5/0, N 6/0, or 10YR 5/1). These horizons are clay or silty clay.

The Blago soils occur with Lawrence and Robertsville soils, but they lack the fragipan of those soils. Blago soils also have a thicker and darker surface layer than those soils.

Blago silt loam (0 to 2 percent slopes) (Bg).—This very poorly drained, nearly level soil is in broad depressions on the Knobs.

Included with this soil in mapping are areas of Lawrence and Robertsville soils.

This Blago soil has a high available moisture capacity, has low natural fertility, and is very strongly acid. The clayey subsoil and seasonal high water table restrict root penetration, air, and water movement. Heavy applications of lime can correct the acidity, and tile draining can correct most of the wetness hazard. This soil then responds well to fertilizer. The organic-matter content is high, and the soil can be tilled throughout a wide range of moisture conditions.

Because of wetness, this soil is suited to only water-tolerant plants. If the soil is tile drained, most locally grown crops are suited, but alfalfa and tobacco may be damaged by excess water during wet periods. A surface drainage system will reduce the wetness enough so that corn and some kinds of hay or pasture plants can be grown. (Capability unit IIIw–2; woodland suitability group 7)

Boonesboro Series

The Boonesboro series consists of moderately deep, well-drained, nearly level soils that formed in alluvium from soils derived primarily from limestone. Boonesboro soils are on long, narrow flood plains of smaller streams, mostly in the northern part of the county.

In a typical profile the surface layer is dark-brown silt loam about 22 inches thick. The subsoil is brown very gravelly silt loam. Limestone bedrock is at a depth of about 31 inches.

Typical profile of Boonesboro silt loam (on the south side of the road on the flood plain of Stony Run, 1.1 miles east of State Route 388 and Stony Run Road intersection, approximately 2.3 miles northeast of Redhouse, and 8.9 miles north-northeast of Richmond):

AP—0 to 7 inches, dark-brown (10YR 3/3) silt loam, brown (10YR 4/3) when dry; strong, fine and medium, granular structure; very friable; many roots, neutral; gradual, smooth boundary.

A1—7 to 22 inches, dark-brown (10YR 3/3) silt loam, brown (10YR 5/3) when dry; moderate, medium and coarse, granular structure; very friable; common roots; neutral; clear, smooth boundary.

B—22 to 31 inches, brown (10YR 4/3) very gravelly silt loam, weak, fine and medium, granular structure; very friable; few roots; 65 percent coarse fragments of limestone and chert; mildly alkaline; calcareous; abrupt, smooth boundary.

R—31 inches +, gray (N 5/0) limestone.

Depth to rock and thickness of the solum range from 20 to 40 inches. The Ap horizon is dark brown (10YR 3/3) or very dark grayish brown (10YR 3/2). The A horizon ranges from 15 to 30 inches in thickness. The B horizon ranges from 5 to 12 inches in thickness.

The Boonesboro soils occur with Huntington and Woolper soils. They are shallower and more gravelly than the Huntington soils. They have a lower clay content throughout and are shallower than the Woolper soils.

Boonesboro silt loam (0 to 4 percent slopes) (Bo).—This is the only soil of the Boonesboro series mapped in the county. Included with this soil in mapping are a few scattered areas of light-colored gravelly silt loams or loams along narrow branch bottoms in the mountainous areas.

The available moisture capacity of this Boonesboro soil is moderate because the root zone is restricted by the gravelly layer at a depth of about 2 feet. This soil is slightly droughty during prolonged dry periods. The natural fertility is high, and plant response to fertilizer is good. The reaction is near neutral, and lime is not needed. Permeability is moderate to moderately rapid. The organic-matter content is high. The soil is easily tilled.

Nearly all areas are cleared and used for crops and pasture. This soil is suited to most commonly grown crops. It is subject to flooding, mostly during winter and early in spring, and this limits the growth of some crops. (Capability unit IIs–1; woodland suitability group 6)

Brassfield Series

The Brassfield series consists of well-drained, calcareous, dominantly strongly sloping to steep soils that formed in marl-like residuum from calcareous siltstone, sandstone, and limestone. They are on side slopes along deep, V-shaped valleys and, to a lesser extent, on long, very narrow ridgetops between valleys.

In a typical profile the surface layer, about 6 inches thick, is dark-gray silt loam that has common siltstone fragments. The subsoil, to a depth of about 18 inches, is olive silt loam that has common siltstone and shale fragments. Below this is greenish-gray, soft, weathered siltstone and shale that extends to bedrock at a depth of about 36 inches.

Brassfield soils are calcareous throughout the profile. Their permeability is moderate.

Typical profile of Brassfield silt loam (2.4 miles northeast of Union City on Union City-Doylesville Road to intersection with gravel road leading east, 0.4 mile east of this intersection, 10.2 miles northeast of Richmond):

Ap—0 to 6 inches, dark-gray (10YR 4/1) silt loam; moderate, fine and medium, granular structure; friable; many roots; 12 percent weathered, calcareous siltstone and sandstone fragments 1/8 inch to 2 inches across; mildly alkaline; calcareous; clear, smooth boundary.

B—6 to 18 inches, olive (5Y 5/4) silt loam; common, medium, distinct mottles of light olive brown (2.5Y 5/4), light olive gray (5Y 6/2), and yellowish brown (10YR 5/6); few peds coated with dark gray; weak, fine and medium, subangular blocky structure; friable; common roots; 12 percent weathered, calcareous siltstone and sandstone fragments 1/8 inch to 2 inches across; mildly alkaline; calcareous; gradual, wavy boundary.

C—18 to 36 inches, greenish-gray (5GY 6/1), soft, weathered siltstone and shale; common, medium, distinct mottles of light olive brown (2.5Y 5/4) and pale olive (5Y 6/4); platy; firm, but breaks down readily by hand to silt loam or loam; few roots; 15 percent hard limestone and calcareous siltstone fragments 1/4 inch to 3 inches across; calcareous; clear, smooth boundary.

R—36 inches +, greenish-gray (5GY 5/1) calcareous siltstone, sandstone, and limestone.

Depth to bedrock ranges from about 20 to 40 inches. The Ap horizon is dark grayish brown (10YR 4/2), gray (10YR 5/1), or dark gray (10YR 4/1). In a few places, the Ap horizon is less than 4 inches thick and is very dark grayish brown (10YR 3/2). The Ap horizon is generally silt loam, but ranges from loam to light silty clay loam. The B and C horizons are commonly silt loam or silty clay loam but range to loam and clay loam.

The Brassfield soils occur with Beasley, Otway, and Fairmount soils. They have a thinner solum than Beasley soils, and they have a less dark surface layer and a less clayey B horizon than the Otway and Fairmount soils.

Brassfield silt loam, 6 to 12 percent slopes (BrC).—This soil is on long, narrow, convex ridgetops.

Included with this soil in mapping are a few small areas that have a dark-colored surface layer, 3 or 4 inches thick, and a few small scattered areas that have slopes of 2 to 6 percent.

The available moisture capacity is low because the root zone is restricted at a depth of about 18 inches. Consequently, this soil is droughty. Natural fertility is moderate, and plant response to fertilizer is fair to poor. This soil is calcareous, and lime is not needed. Organic-matter content is very low, but tillage is easy.

Most areas have been used for crops and pasture, but because this soil is not suited to row crops, most areas are now used for pasture. Some areas are growing up in brush or are reverting to woods. (Capability unit VIe–2; woodland suitability group 5)

Brassfield silt loam, 12 to 30 percent slopes (BrE).—This soil is on side slopes of deep, V-shaped valleys. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas of Otway soils and of Gullied land.

The available moisture capacity is low because the root zone is restricted at a depth of about 18 inches. As a result, this soil is droughty. Natural fertility is moderate, and plant response to fertilizer is poor. This soil is calcareous, and lime is not needed. Organic-matter content is very low. Common shallow gullies and small rock fragments in the surface layer make tillage somewhat difficult. Good stands of pasture are also difficult to obtain.

Most areas have been used for crops and pasture, but because this soil is not suited to row crops and tillage is difficult, only a few areas are used for pasture, and some areas are growing up in brush or reverting to woods. (Capability unit VIIe–1; woodland suitability group 5)

Brassfield silt loam, 30 to 50 percent slopes (BrF).—This soil is on side slopes of deep, V-shaped valleys.

Included with this soil in mapping are a few small areas of Otway and Fairmount soils and a few small scattered areas of rock land.

The available moisture capacity is low because the root zone is restricted at a depth of about 18 inches. Consequently, this soil is droughty. This soil is calcareous, its natural fertility is moderate, and its organic-matter content is very low. Steep slopes and shallow gullies make the use of modern farm machinery for tilling nearly impossible.

Most areas have been used for pasture and crops, but because tillage is very difficult, most areas are now growing up in brush or reverting to woods. (Capability unit VIIe–1; woodland suitability group 5)

Caleast Series

The Caleast series consists of deep, well-drained soils that formed in residuum from limestone. These soils are gently sloping to sloping and are on ridgetops.

In a typical profile the surface layer is dark-brown silt loam about 8 inches thick. The subsoil extends to a depth

of about 32 inches and is dark yellowish-brown and yellowish-brown silty clay that has grayish variegations and a higher clay content below a depth of about 25 inches. The underlying material is light olive-brown, plastic clay.

The Caleast soils are medium acid to slightly acid and have moderate natural fertility. Permeability is moderate to a depth of about 25 inches and is slow below this depth.

Typical profile of a Caleast silt loam (1¼ miles west of U.S. Highway No. 25, one-fourth mile south of Interstate Highway No. 75 and U.S. Highway No. 227 interchange):

Ap—0 to 8 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; very friable; many small roots; few, small, black concretions; slightly acid; gradual, smooth boundary.

B1t—8 to 13 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; friable; slightly sticky; few thin clay films; few black concretions; slightly acid; gradual, smooth boundary.

B2t—13 to 25 inches, yellowish-brown (10YR 5/6) silty clay; strong, fine and medium, angular blocky structure; firm, sticky and plastic; common clay films; common, small, black concretions; medium acid; gradual, smooth boundary.

B3t—25 to 32 inches, yellowish-brown (10YR 5/6) silty clay; common, fine, distinct variegations of strong brown, light brownish gray, and pale brown; moderate, medium, angular blocky structure; very firm, sticky and plastic; few clay films; common black and dark-brown concretions; medium acid; gradual, smooth boundary.

C—32 to 46 inches +, light olive-brown (2.5Y 5/6) clay; common medium variegations of light brownish gray and yellowish brown; massive; very firm, sticky and plastic; few, small, black concretions; medium acid.

The solum ranges from 24 to 40 inches in thickness. The depth to bedrock ranges from 3½ to 7 feet or more. Reaction is medium acid to slightly acid throughout. The B1t horizon is dark yellowish brown (10YR 4/4), brown (10YR 4/3), yellowish brown (10YR 5/4), or brown (7.5YR 4/4). The B2t horizon is yellowish brown (10YR 5/4 or 5/6), dark yellowish brown (10YR 4/4), or brown (7.5YR 4/4). The B3t horizon is evenly mottled yellowish brown and light brownish gray in some places. The C horizon is evenly mottled light olive brown (2.5Y 5/6) and light brownish gray (10YR 6/2) in some places.

The Caleast soils occur with Lowell, Shelbyville, Faywood, and Cynthiana soils. Caleast soils have a darker colored A horizon and a less acid B horizon than the Lowell soils. They have a more clayey upper B horizon than the Shelbyville soils. They are deeper than the Faywood and Cynthiana soils.

Caleast silt loam, 2 to 6 percent slopes (CaB).—This soil is on convex, long, narrow and wide ridgetops. Some areas have small sinks or depressions that may be slightly wet at times. A profile of this soil is described as typical for the series.

The available moisture capacity is high but the root zone is slightly restricted by the slowly permeable layer at a depth of about 32 inches. The natural fertility is moderate, organic-matter content is medium, and the reaction is medium acid to slightly acid. Crops respond well to applications of lime and fertilizer. This soil is easy to till.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe-2; woodland suitability group 1)

Caleast silt loam, 6 to 12 percent slopes (CaC).—This soil is on convex, long, narrow and somewhat wide ridgetops.

Included with the soil in mapping are some small areas of Lowell soils.

The available moisture capacity is high, but the root zone is slightly restricted by the slowly permeable layer at a depth of about 32 inches. Natural fertility is moderate, organic-matter content is medium, and the reaction is medium acid to slightly acid. Crops respond well to applications of lime and fertilizer. This soil is easy to till.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe-2; woodland suitability group 1)

Caneyville Series

The Caneyville series consists of moderately deep, well-drained soils that have many small and large limestone fragments on the surface. These soils formed in mixed residuum or colluvium from limestone, shale, and siltstone. They are on the upper half of the steep mountainsides.

In a typical profile the surface layer is very stony silt loam about 6 inches thick. The subsoil is mainly yellowish-red, firm silty clay loam to a depth of 12 inches and is strong-brown, very firm silty clay to a depth of 30 inches. Below the subsoil is highly weathered siltstone or shale. Stones occur throughout the profile.

Typical profile of Caneyville very stony silt loam (2¼ miles south of Berea on the west side of Bear Mountain, one-fourth mile south and 0.6 mile east of old Scaffold Cane School):

A1—0 to 3 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; very friable; many small roots; 5 to 25 percent large and small limestone fragments; slightly acid; clear, smooth boundary.

B1—3 to 6 inches, brown (7.5YR 4/4) silt loam; weak, fine, blocky structure; friable; many small roots; 5 to 25 percent large and small limestone fragments; slightly acid; clear, smooth boundary.

B21t—6 to 12 inches, yellowish-red (5YR 5/8) heavy silty clay loam; moderate, fine and medium, blocky structure; firm; common small roots; common thin clay films; 10 to 40 percent large and small limestone fragments; medium acid; gradual, smooth boundary.

B22t—12 to 24 inches, strong-brown (7.5YR 5/6) silty clay; moderate, fine and medium, blocky structure; very firm, sticky and plastic; few roots; few thin clay films; 10 to 40 percent small and large rock fragments; slightly acid; gradual, smooth boundary.

B3—24 to 30 inches, strong-brown (7.5YR5/6) silty clay; weak, medium, blocky structure; very firm, sticky and plastic; 10 to 50 percent rock fragments; slightly acid.

R—30 inches +, brownish, highly weathered siltstone.

The depth to bedrock and the thickness of the solum range from 20 to 40 inches. The A horizon ranges from 1 to 6 inches in thickness, and in some places a lighter colored A2 horizon makes up over half of the A horizon. The B horizon is brownish yellow (10YR 6/6) in some places. The underlying rock is commonly olive-colored shale. The reaction is medium acid to slightly acid throughout the profile.

Caneyville soils occur with Woolper and Weikert soils. They are less acid, deeper to bedrock, and are higher on mountainsides than the Weikert soils. Caneyville soils have a thinner and lighter colored surface layer than the Woolper soils, which are neutral throughout.

Caneyville very stony silt loam, 35 to 60 percent slopes (CeF).—This soil is the only soil of the Caneyville series mapped in the county. Included with it in mapping are a few small areas that are dominantly rock outcrop.

The available moisture capacity is moderate and the root zone is moderately deep. Natural fertility is moderate, and reaction is medium acid to slightly acid. Permeability is moderately slow, and organic-matter content is low.

Nearly all areas are in woods, but some areas were cleared and used for crops and pasture in the past. This soil is suited only to woodland because of the steep slopes and stoniness. (Capability unit VIIs-1; woodland suitability group 2)

Captina Series

The Captina series consists of moderately well drained soils that have a fragipan at a depth of about 20 inches. These soils are nearly level and gently sloping and are in colluvial areas, on ridgetops, and on stream terraces in the Knobs and Mountain sections of the county. They formed in alluvium or colluvium, chiefly from acid siltstone or shale.

In a typical profile the surface layer is grayish-brown silt loam about 6 inches thick. The upper part of the subsoil is light olive-brown heavy silt loam that extends to a depth of about 20 inches. The lower part is a firm, compact fragipan of mottled, light-gray and light olive-brown heavy silt loam that extends to a depth of 48 inches or more.

The Captina soils have low natural fertility and are very strongly acid. Permeability is moderate to a depth of 20 inches and is slow below this depth.

Typical profile of a Captina silt loam (1¼ miles south of State Route 21, 1½ miles east of Berea):

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; very friable; many small roots; few small pebbles; very strongly acid; clear, smooth boundary.

B2—6 to 20 inches, light olive-brown (2.5Y 5/6) heavy silt loam; weak, fine, blocky structure; friable; common small roots; few small pebbles, small rock fragments, and concretions; very strongly acid; gradual, smooth boundary.

Bx1—20 to 30 inches, light olive-brown (2.5Y 5/6) heavy silt loam; many, medium, faint mottles of light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6); weak, medium, blocky structure; firm, compact, and brittle; common, light-gray silt coatings; 1 percent small siltstone rock fragments; very strongly acid; gradual, smooth boundary.

Bx2—30 to 48 inches +, mottled, light-gray (2.5Y 7/2), light olive-brown (2.5Y 5/6), and yellowish-brown (10YR 5/6) silt loam; mottles are medium and distinct; weak, medium, blocky structure; firm, compact, and brittle; 5 percent small and medium-sized rock fragments; very strongly acid.

The depth to black shale, acid clay shale, or siltstone rock rubble ranges from 40 inches to 70 inches or more. The solum ranges from 40 to 60 inches in thickness. Depth to the fragipan ranges from 14 to 24 inches. The Ap horizon is grayish brown (10YR 5/2), dark grayish brown (2.5Y 4/2), or brown (10YR 5/3). In severely eroded areas, it commonly is olive brown. The B2 horizon is light olive brown (2.5Y 5/6), yellowish brown (10YR 5/4), or light yellowish brown (2.5Y 6/4). The B horizon ranges from silt loam to light silty clay loam. In places the Bx horizon has a dominant color of light brownish gray (2.5Y 6/2) or light gray (2.5Y 7/2). These soils do not have strong evidence of clay accumulation in the B horizon above the fragipan. Below the Bx horizon in some places there is a C horizon that is similar in color and texture to the Bx2 horizon. On stream terraces, the C horizon may be stratified gravelly and sandy material.

The Captina soils occur mostly with the Berea, Whitley, and Shelocta soils. The Captina soils are similar to the Berea soils but are deeper to bedrock and have a fragipan. They are not so well drained as the Whitley and Shelocta soils. In contrast to Captina soils, the Shelocta soils are gravelly throughout.

Captina silt loam, 0 to 2 percent slopes (CnA).—This soil is on wide ridgetops and stream terraces in the Knobs and Mountain sections.

Included with this soil in mapping are a few, small somewhat poorly drained areas.

The available moisture capacity is only moderate because the root zone is restricted by the fragipan at a depth of about 20 inches. Slow surface runoff and slow permeability cause a moderate wetness limitation during periods of high rainfall. A seasonal high water table is at a depth of about 1 foot. Crop response to lime and fertilizer is good. The organic-matter content is low, but this soil is easily tilled.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops, but tobacco (fig. 6) and alfalfa may be damaged by wetness. (Capability unit IIw-1; woodland suitability group 8)

Captina silt loam, 2 to 6 percent slopes (CnB).—This soil is on convex, wide ridgetops, on concave stream terraces, and in colluvial areas. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas with a surface layer that is a mixture of subsoil material and the original surface layer.

The available moisture capacity is only moderate because the root zone is restricted by the fragipan at a depth

Figure 6.—Burley tobacco on Captina silt loam, 0 to 2 percent slopes. Weikert and Caneyville soils are on mountain in background.

of about 20 inches. Organic-matter content is low, but this soil is easily tilled. Crop response to lime and fertilizer is good.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops, but the erosion hazard is moderate when row crops are grown. Tobacco and alfalfa may be damaged by wetness. (Capability unit IIe-3; woodland suitability group 8)

Captina silt loam, 6 to 12 percent slopes (CnC).—This soil is along drainageways and on concave colluvial slopes below mountains. Its profile differs from the one described as typical of the series in that the surface layer is brown silt loam that is a mixture of subsoil material and the original surface layer. Also, the fragipan is at a slightly shallower depth.

Included with this soil in mapping are a few uneroded areas. Also included are a few, small, severely eroded areas that have a surface layer consisting mostly of material that formerly was subsoil. These are noticeable as yellowish spots when a field is plowed.

The available moisture capacity is only moderate because the root zone is restricted by the fragipan at a depth of about 17 inches. Crop response to lime and fertilizer is good. Organic-matter content is low, but this soil is easily tilled.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops, but the erosion hazard is severe where row crops are grown. Tobacco and alfalfa may be damaged by the restricted root zone and by wetness following heavy rainfall. (Capability unit IIIe-3; woodland suitability group 8)

Captina silt loam, 6 to 12 percent slopes, severely eroded (CnC3).—This soil is along drainageways that dissect the ridgetops and colluvial slopes. Its profile differs from the one described as typical of the series in that the surface layer is olive-brown heavy silt loam that is all or mostly subsoil material and the fragipan is at a depth of about 14 inches.

The available moisture capacity is low to moderate because the root zone is restricted by the fragipan. Natural fertility is low, reaction is very strongly acid, and crop response to lime and fertilizer is fair. The very low organic-matter content and common small gullies make tillage somewhat difficult. Good stands of crops and pasture are difficult to obtain.

Most areas are used for crops and pasture, but some areas are growing up in brush or reverting to woods. This soil is suited to drought-resistant crops and pasture plants, but the erosion hazard is very severe where row crops are grown. (Capability unit IVe-6; woodland suitability group 9)

Colyer Series

The Colyer series consists of shallow, excessively drained soils that formed in residuum from black shale. These soils are strongly sloping to steep and are on side slopes.

In a typical profile the surface layer is brown shaly silt loam about 5 inches thick. The subsoil is yellowish-brown shaly silty clay loam that extends to a depth of 15 inches. Below the subsoil is highly weathered black shale that becomes hard shale at 20 inches.

The Colyer soils are very low to low in natural fertility and are very strongly acid. Permeability is moderate.

Typical profile of Colyer shaly silt loam (200 yards west of Interstate Highway No. 75, one-half mile north of the Berea interchange):

Ap—0 to 5 inches, brown (10YR 5/3) shaly silt loam; weak, fine, granular structure; very friable; 15 to 20 percent small, black shale fragments; many small roots; very strongly acid; clear, smooth boundary.

B2—5 to 15 inches, yellowish-brown (10YR 5/4) shaly heavy silty clay loam; weak, fine and medium, blocky structure; 35 percent black shale fragments; friable to firm; common roots; very strongly acid; clear, smooth boundary.

C—15 to 20 inches, 75 percent highly weathered black shale; layers between are brown (10YR 5/3) heavy silty clay loam; massive; firm; very strongly acid.

R—20 inches +, hard, brittle, black shale.

The depth to black shale rock ranges from 8 to 20 inches. The solum ranges from 8 to 15 inches in thickness. Except in severely eroded areas, the Ap horizon is brown (10YR 4/3 or 5/3). In severely eroded areas, it commonly is yellowish-brown silty clay loam. In wooded areas there are thin A1 and B1 horizons instead of the Ap horizon. The A1 horizon is very dark grayish-brown (10YR 3/2) shaly silt loam about 3 inches thick, and the B1 horizon is brown (10YR 4/3) shaly silt loam. The B horizon ranges from yellowish brown (10YR 5/4) to brown (7.5YR 5/4) and is silty clay loam or silty clay. The B horizon is 25 to 65 percent black shale fragments.

The Colyer soils occur with Trappist, Berea, and Rockcastle soils. Colyer soils have a thinner solum and are less red in the B horizon than the Trappist soils. They are better drained and shallower to rock than Berea soils. Colyer soils have a less clayey B horizon than Rockcastle soils, which formed in acid clay shale.

Colyer shaly silt loam, 12 to 50 percent slopes (CoF).—This soil is on side slopes in deep, wide valleys that dissect the Knobs area, and it is on some lower slopes of the mountains. A profile of this soil is described as typical for the series.

The available moisture capacity is low because the root zone is restricted by black shale at a depth of about 15 inches. Organic-matter content and natural fertility are low. Crop response to lime and fertilizer is fair. This soil is easily tilled in areas where slope is not excessive.

Much of this soil is in woods, but some rather extensive areas are cleared and used for pasture. This soil is not suited to crops. (Capability unit VIIs-1; woodland suitability group 11)

Colyer shaly silty clay loam, 12 to 50 percent slopes, severely eroded (CsF3).—This soil is on side slopes in valleys that dissect the Knobs area. Its profile differs from the one described as typical for the series in that the original surface layer has been lost through erosion and the present surface layer is yellowish-brown silty clay loam.

Included with this soil in mapping are some areas of Rock outcrop, shale, and of loose, highly weathered shale about 6 inches thick that overlies hard rock.

The available moisture capacity is very low, as the root zone is restricted by black shale at a depth of about 10 inches. Very low organic-matter content and common shallow gullies make tillage difficult. Natural fertility is very low, and this soil is very droughty. Crop response to lime and fertilizer is poor.

Most areas have been cleared, but many areas have reverted to low quality woods. Pasture is of low quality. This soil is not suited to crops. (Capability unit VIIs-2; woodland suitability group 5)

Culleoka Series

The Culleoka series consists of moderately deep, well-drained soils that formed in residuum from calcareous siltstone and a small amount of calcareous shale and limestone. These soils are gently sloping and sloping on ridgetops and are strongly sloping to steep on side slopes of deep, V-shaped valleys in the northwestern part of the county.

In a typical profile the surface layer is brown silt loam about 9 inches thick. The subsoil is brown silt loam in the upper 4 inches. Below this the subsoil is light silty clay loam that is brown in the upper part and yellowish brown in the lower part. Underlying the subsoil is dark yellowish-brown light silty clay loam. Siltstone or sandstone is at a depth of 36 inches.

The Culleoka soils are medium acid and have moderate natural fertility and permeability.

Typical profile of a Culleoka silt loam (0.8 mile east of Interstate Highway No. 75, along first road south of the Kentucky River):

Ap—0 to 9 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B1—9 to 13 inches, brown (7.5YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; few, small, black concretions; medium acid; gradual, smooth boundary.

B2t—13 to 26 inches, brown (7.5YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure; friable to firm; few clay films; few, small, black concretions; few, small, yellowish-brown siltstone channery fragments; medium acid; gradual, smooth boundary.

C—26 to 36 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; massive; firm; common, small, black concretions; common, yellowish-brown siltstone channery fragments ranging up to 6 inches in length; medium acid.

R—36 inches +, calcareous siltstone and sandstone.

The depth to bedrock ranges from 20 to 40 inches. The B horizon is brown (7.5YR 4/4), yellowish-brown (10YR 5/4), and dark yellowish brown (10YR 4/4). It ranges from light silty clay loam to heavy silt loam. The C horizon is dark yellowish brown (10YR 4/4) or yellowish brown (10YR 5/4). In places the C horizon has stratified layers of silty clay and highly weathered siltstone. The B horizon is medium acid to strongly acid, and the C horizon is medium acid to neutral.

The Culleoka soils occur with Eden and Mercer soils. They are less clayey in the B horizon and are shallower to bedrock than the Eden soils, and they lack the fragipan of the Mercer soils.

Culleoka silt loam, 2 to 6 percent slopes (CuB).—This soil is on long, narrow, convex ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas with a surface layer that is a mixture of subsoil material and the original surface layer. Also included are a few, small, scattered areas of Faywood soils.

The available moisture capacity is high, but the root zone is restricted by siltstone at a depth of about 36 inches. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. Organic-matter content is medium, and tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–1; woodland suitability group 1)

Culleoka silt loam, 6 to 12 percent slopes (CuC).—This soil is on long, narrow, convex ridgetops. Its profile differs from the one described as typical for the series in that the plow layer is a dark yellowish-brown mixture of subsoil material and the original surface layer, and the depth to bedrock is about 30 inches.

Included with this soil in mapping are a few, small, severely eroded areas that have a surface layer consisting mostly of subsoil. There are noticeable yellow spots where a field is plowed.

The available moisture capacity is high, but the root zone is restricted by siltstone at a depth of about 30 inches. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. The organic-matter content is low. Tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe–1; woodland suitability group 1)

Culleoka silt loam, 12 to 20 percent slopes (CuD).—This soil is on upper side slopes of deep, V-shaped valleys. Its profile differs from the one described as typical for the series in that the surface layer is a dark yellowish-brown mixture of subsoil material and the original surface layer, and the depth to bedrock is about 30 inches.

Included with this soil in mapping are some areas in which up to 15 percent of the surface is covered with flagstones of highly weathered siltstone. Also included are a few, small, scattered, severely eroded areas.

The available moisture capacity is high, but the root zone is restricted by siltstone at a depth of about 30 inches. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. The organic-matter content is low, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is very severe where row crops are grown. (Capability unit IVe–1; woodland suitability group 1)

Culleoka flaggy silt loam, 20 to 30 percent slopes (CwE).—This soil is on side slopes of deep, V-shaped valleys. Its profile differs from the one described as typical for the series in that from 10 to 25 percent of the soil volume is flagstones of highly weathered, soft siltstone; the surface layer is a dark yellowish-brown mixture of subsoil material and the original surface layer; and the depth to siltstone bedrock is about 24 inches.

Included with this soil in mapping are some severely eroded areas that have a surface layer consisting mostly of material that formerly was subsoil.

The available moisture capacity is moderate because the root zone is restricted by rock at a depth of about 24 inches. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. Low organic-matter content, the presence of flagstones, and moderately steep slopes make machinery operation and tillage somewhat difficult.

Practically all areas have been used for crops and pasture, but most areas are now used for pasture, as this soil is not suited to row crops. It is suited to all commonly grown pasture plants. (Capability unit VIe–1; woodland suitability group 1)

Culleoka flaggy silt loam, 30 to 50 percent slopes (CwF).—This soil is on side slopes of deep, V-shaped valleys. Its profile differs from the one described as typical for the series in that from 10 to 25 percent of the soil volume is flagstones of highly weathered soft siltstone; the surface

layer is less than 4 inches thick or is a mixture of subsoil material and the original surface layer; and the depth to bedrock is about 24 inches.

Included with this soil in mapping are some severely eroded areas that have a surface layer consisting mostly of subsoil. Also included are a few, small, scattered areas of Eden soil.

Natural fertility is moderate, reaction is medium acid, and organic-matter content is low. Steep slopes and flagstones on the surface make the use of modern farm machinery nearly impossible.

Some rather large areas have remained wooded, but many other areas have been used for crops and pasture. This soil is suited to most commonly grown pasture plants, but the difficulty of maintaining these plants has resulted in most areas reverting to woodland. (Capability unit VIIe–1; woodland suitability group 1)

Cynthiana Series

The Cynthiana series consists of shallow, well-drained soils. These soils are strongly sloping to moderately steep and are on side slopes of valleys between ridgetops. Five to 15 percent of the surface area is covered with flagstones.

In a typical profile the surface layer is dark grayish-brown silty clay loam about 4 inches thick. The subsoil is yellowish-brown silty clay. It is underlain at a depth of about 16 inches by limestone.

The Cynthiana soils are slightly acid to neutral and have moderate natural fertility, but they are droughty. Permeability is moderately slow.

Typical profile of a Cynthiana silty clay loam (one-half mile northeast of the intersection of Stony Run and State Route 388):

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) silty clay loam; moderate, fine, granular structure; friable; 5 to 15 percent limestone rock fragments; slightly acid; abrupt, smooth boundary.

Bt—4 to 16 inches, yellowish-brown (10YR 5/4) silty clay; many brown (10YR 4/3) clay films and coatings on ped surfaces; strong, fine and medium, blocky structure; very firm, sticky and plastic when wet; 10 to 20 percent limestone rock fragments; few, small, black concretions; neutral; lower 1 or 2 inches contains many very small fragments of chert and is calcareous.

R—16 inches, limestone.

Depth to bedrock ranges from 8 to 20 inches. The A horizon is slightly acid to neutral, and the B horizon is neutral to mildly alkaline. The B horizon ranges from 6 to 14 inches in thickness. The B horizon, in some places, is dark yellowish brown (10YR 4/4) and is silty clay or clay.

The Cynthiana soils occur with Faywood, Lowell, Opequon, and Fairmount soils. They are not so deep to bedrock as Faywood and Lowell soils. Cynthiana soils have a thinner, less dark surface layer than the Fairmount soils. They have a less red B horizon than the Opequon soils.

Cynthiana-Rock outcrop complex, 12 to 30 percent slopes (CyE).—The Cynthiana soils and Rock outcrop were mapped together as a complex because they are intermingled in such intricate patterns that separation is not practical. Rock outcrop makes up 25 to 50 percent of the mapping unit. This complex (fig. 7) is on side slopes of valleys between long, narrow ridgetops.

Included with this complex in mapping are a few small areas of Faywood and Lowell soils, and several, small, scattered areas have slopes of 6 to 12 percent.

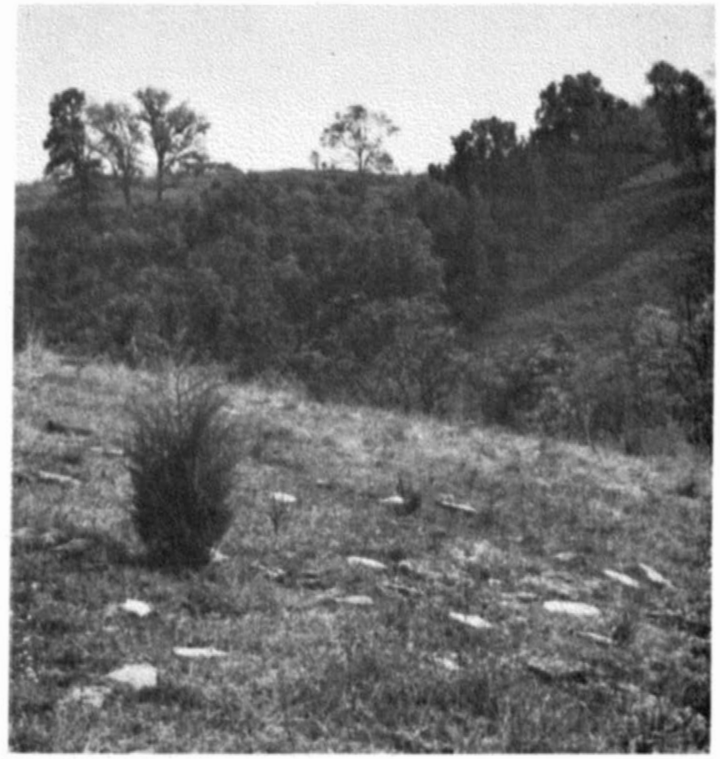

Figure 7.—**Cynthiana-Rock outcrop complex, 12 to 30 percent slope. Area in foreground is starting to grow up in brush. Background area is in a managed pasture.**

The Cynthiana soils in this mapping unit have a low available moisture capacity, and they are droughty because the root zone is restricted by limestone at a depth of about 16 inches. Natural fertility is moderate, and crop response to fertilizer is poor to fair. Reaction is slightly acid, and lime generally is not needed. Rock outcrops and flagstones make tillage difficult and hamper the operation of farm machinery. Rock outcrop supports very little plant growth.

Most areas are used for pasture, as the soil is not suited to row crops. Some areas have remained wooded, and a few areas are growing up in brush or reverting to woods. (Capability unit VIe–1; woodland suitability group 12)

Dunning Series

The Dunning series consists of nearly level, poorly drained to very poorly drained soils on the flood plains.

In a typical profile the surface layer is very dark grayish-brown and very dark gray silty clay loam about 18 inches thick. The subsoil is dark grayish-brown, mottled silty clay to a depth of 24 inches and light olive-gray, mottled clay to a depth of 48 inches or more.

Typical profile of Dunning silty clay loam (on Walnut Meadow road, State Route 595, 2 miles west of Interstate Highway No. 75):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium, granular structure; firm to friable; slightly sticky; many small roots; neutral; gradual, smooth boundary.

A1—8 to 18 inches, very dark gray (10YR 3/1) heavy silty clay loam; weak, medium, granular structure; firm, slightly sticky; common roots; neutral; gradual, smooth boundary.

B21g—18 to 24 inches, dark grayish-brown (2.5Y 4/2) silty clay; common, fine, distinct mottles of strong brown (7.5YR 5/6); weak, medium, angular blocky structure; firm; neutral; gradual, smooth boundary.

B22g—24 to 48 inches, light olive-gray (5Y 6/2) clay; common, fine, distinct mottles of light olive brown (2.5Y 5/4); massive; very firm, sticky and plastic; common, dark-brown and black concretions; neutral.

The A horizon ranges from 12 to 24 inches in thickness and from black (10YR 2/1) to very dark gray (10YR 3/1) in color. The B horizon is dark grayish brown (2.5Y 4/2), light olive gray (5Y 6/2), gray (N 6/1), or dark gray (5Y 4/1). The mottles are dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), or light olive brown (2.5Y 5/4). The B horizon is silty clay to clay.

The Dunning soils occur with Melvin and Newark soils. The Dunning soils have a darker colored and thicker surface layer than the Melvin soils. They are more poorly drained than the Newark soils and have a darker colored surface layer.

Dunning silty clay loam (0 to 2 percent slopes) (Du).—This is the only soil of the Dunning series mapped in the county. Included with this soil in mapping are a few small areas of soils in depressions, on uplands, and on stream terraces that have similar characteristics. Also included are a few areas that have a brown silt loam overwash layer that is up to 8 inches thick.

The available moisture capacity, natural fertility, and organic-matter content are high. A seasonal high water table and slow permeability restrict root penetration. This soil is nearly neutral in reaction and generally does not need lime. Crop response to fertilizer is good. Tillage is somewhat difficult because of the high clay content of the surface layer.

Practically all areas are used for crops and pasture. This soil is suited to tile drainage and, after it is drained, is suited to most commonly grown crops except alfalfa and tobacco, which may be damaged during wet periods. (Capability unit IIIw–2; woodland suitability group 7)

Eden Series

The Eden series consists of deep, well-drained soils that formed in residuum derived from calcareous shale, siltstone, and limestone. These soils are moderately steep to steep on side slopes of V-shaped valleys between narrow ridgetops and, to a minor extent, are sloping to strongly sloping on ridgetops.

In a typical profile the surface layer is brown silty clay loam about 4 inches thick. The subsoil, to a depth of about 12 inches, is dark yellowish-brown flaggy silty clay. The subsoil is underlain by light olive-brown, sticky clay to a depth of 32 inches. Below this is pale-olive, plastic clay. Flagstones are common throughout the profile.

The Eden soils are neutral in reaction and have moderate natural fertility. Permeability is moderate to a depth of 12 inches and slow below this depth.

Typical profile of Eden silty clay loam (1 mile south of Tate Creek Road on Crutcher Pike):

Ap—0 to 4 inches, brown (10YR 5/3) silty clay loam; moderate, medium, granular structure; friable, slightly sticky; 5 to 15 percent flagstones up to 12 inches across; many small roots; neutral; clear, smooth boundary.

B2t—4 to 12 inches, dark yellowish-brown (10YR 4/4) silty clay; weak, medium, blocky structure; very firm, sticky and plastic; few clay films; 5 to 15 percent flagstones; neutral; clear, smooth boundary.

C1—12 to 32 inches, light olive-brown (2.5Y 5/4) clay; many, fine, faint mottles of olive (5Y 5/3) and olive yellow (2.5Y 6/6); massive; very firm, very sticky and plastic; few, small, dark-brown concretions; 10 to 25 percent flagstones; mildly alkaline; gradual, smooth boundary.

C2—32 to 48 inches +, pale-olive (5Y 6/3) clay; many, medium, faint mottles of light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6); massive; very firm, very sticky and plastic; 20 to 40 percent limestone, siltstone, and shale fragments; mildly alkaline.

The depth to bedrock ranges from 4 to 6 feet. The Ap horizon is brown (10YR 5/3) or dark grayish brown (10YR 4/2). The B horizon is olive-brown (2.5Y 4/4), dark yellowish-brown (10YR 4/4), or yellowish-brown (10YR 5/4) silty clay or clay. The C horizon is light olive brown (2.5Y 5/4), pale olive (5Y 6/3), olive gray (2.5Y 5/2), or light olive gray ((5Y 6/2).

The Eden soils occur with Culleoka, Faywood, and Cynthiana soils. They are deeper to bedrock than the Cynthiana soils. They are deeper to bedrock and have a thinner, less acid B horizon than the Faywood soils. The Eden soils are more clayey throughout and have a thinner, less acid B horizon than the Culleoka soils.

Eden silty clay loam, 6 to 20 percent slopes, eroded (EdD2).—This soil is on long, narrow, convex ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some severely eroded areas that have a higher clay content in the surface layer than typical and are relatively free of flagstones to a depth of about 12 inches.

The available moisture capacity is only moderate because the root zone is restricted to a depth of about 24 inches. Natural fertility is moderate, and crops respond fairly well to fertilizer. Reaction is neutral, and lime is not needed. The low organic-matter content and the high clay content in the surface layer make tillage somewhat difficult.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is very severe where row crops are grown. (Capability unit IVe–2; woodland suitability group 4)

Eden flaggy clay, 20 to 30 percent slopes, eroded (EeE2).—This soil is on side slopes of deep, V-shaped valleys. Its profile differs from the one described as typical for the series in that the surface layer is mostly subsoil material and is more clayey.

Included with this soil in mapping are a few small areas that have a silt loam surface layer that contains 10 to 25 percent soft siltstone fragments, some areas that have a silty clay loam surface layer, and a few small areas of Lowell and Faywood soils.

The available moisture capacity is only moderate because the root zone is restricted to a depth of about 24 inches. Natural fertility is moderate, and crop response to fertilizer is fair to poor. Reaction is neutral, and lime is not needed. Organic-matter content is very low or low. The high clay content and flagstones in the surface layer make tillage difficult.

Practically all areas have been used for crops and pasture, but most areas are now used for pasture. Some areas have grown up in brush and are reverting to woods. This soil is not suited to row crops, because it is so steep, but it is suited to hardy, drought-resistant pasture plants. (Capability unit VIe–1; woodland suitability group 4)

Eden flaggy clay, 30 to 50 percent slopes, eroded (EeF2).—This soil is on side slopes of deep, V-shaped valleys. Its profile differs from the one described as typical for the series in that the surface layer is mostly subsoil material and is more clayey.

Included with this soil in mapping are a few small areas that have a silt loam surface layer about 6 inches thick that contains 10 to 25 percent soft siltstone fragments and areas that have a silty clay loam surface layer.

The available moisture capacity is only moderate because the root zone is restricted to a depth of about 24 inches. Natural fertility is moderate, reaction is neutral, and organic-matter content is low or very low. Steep slopes and flagstones in the surface layer make use of modern farm machinery nearly impossible.

Some areas have remained wooded, but many areas have been used for crops and pasture. This soil is not suited to row crops, because of steep slopes. It is suited to most pasture plants, but the difficulty in maintaining pasture has resulted in most areas reverting to woodland. (Capability unit VIIe-1; woodland suitability group 4)

Egam Series

The Egam series consists of well drained to moderately well drained soils that formed on flood plains in areas of limestone.

In a typical profile the surface layer is silty clay loam that extends to a depth of about 34 inches. It is very dark brown in the upper 11 inches and very dark grayish brown below that depth. The lower 14 inches is very firm and compact. The subsoil extends to a depth of 47 inches or more and is dark yellowish-brown silty clay loam.

Typical profile of Egam silty clay loam (3 miles east of State Route 388 on the Union City Road, near East Fork of Otter Creek):

Ap—0 to 11 inches, very dark brown (10YR 2/2) silty clay loam; weak, fine and medium, granular structure; friable; slightly acid; gradual, smooth boundary.

A11—11 to 20 inches, very dark grayish-brown (10YR 3/2) heavy silty clay loam; weak, medium, granular and weak, fine, subangular blocky structure; firm, sticky and slightly plastic; slightly acid; gradual, smooth boundary.

A12—20 to 34 inches, very dark grayish-brown (10YR 3/2) silty clay loam; weak, fine and medium, subangular blocky and moderate, fine, granular structure; very firm, compact, sticky and plastic; slightly acid; clear, smooth boundary.

B—34 to 47 inches +, dark yellowish-brown (10YR 3/4) heavy silty clay loam; moderate, medium and fine, subangular blocky structure; firm, sticky and plastic; few thin clay films; common, fine and medium, faint mottles, mostly of brown (10YR 5/3); common, small, dark-brown and strong-brown concretions; dark organic staining on some ped surfaces; slightly acid to neutral.

The depth to the compact layer (A12 horizon) ranges from 15 to 30 inches. The Ap and A1 horizons are black (10YR 2/1), dark brown (10YR 3/3), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). Below the Ap horizon is heavy silty clay loam or silty clay. The B horizon is dark brown (10YR 3/3) in some places. Reaction is slightly acid to neutral throughout.

The annual temperature of these soils is a few degrees cooler than the defined range for the Egam series, but this does not affect their use and behavior.

The Egam soils occur with Huntington, Lindside, Newark, and Dunning soils. They have a higher clay content throughout than the Huntington, Lindside, and Newark soils. The Egam soils are less well drained than the Huntington soils and are about the same in drainage as the Lindside soils, which do not have the compact layer of the Egam soils. They are better drained than the Newark and Dunning soils.

Egam silty clay loam (0 to 4 percent slopes) (Eg).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few small areas of Lindside soils.

The available moisture capacity is high, but the root zone is slightly restricted by the compact layer at a depth of about 20 inches. A seasonal high water table is at a depth of 2 to 3 feet. Natural fertility is high, and reaction is slightly acid. Permeability is moderate to a depth of 20 inches and slow at a depth below that. Crop response to fertilizer is good, and lime may be needed only for crops like alfalfa. Organic-matter content is high, but tillage is somewhat difficult because of the clay content of the surface layer. Drainage can be beneficial in some areas but generally is not needed for most crops.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops. The hazard of erosion is only slight when row crops are grown. (Capability unit I-2; woodland suitability group 6)

Elk Series

The Elk series consists of deep, well drained, nearly level to strongly sloping soils. These soils are on terraces along most of the major streams in the county and, to a lesser extent, on higher ridgetops along former runs of these streams.

In a typical profile the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of about 40 inches, is brown and strong-brown silty clay loam. Below this is yellowish-brown silty clay loam that has mottles of pale brown.

The Elk soils are medium acid and have moderate natural fertility and permeability.

Typical profile of an Elk silt loam (3 miles south of Barnes Mill Road on Curtis Pike, one-half mile from Silver Creek bridge):

Ap—0 to 10 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B1—10 to 15 inches, brown (7.5YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure; friable; medium acid; gradual, smooth boundary.

B21t—15 to 25 inches, brown (7.5YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure; friable to firm; few patchy clay films; few, small, black concretions; strongly acid; gradual, smooth boundary.

B22t—25 to 40 inches, strong-brown (7.5YR 5/6) silty clay loam; few, fine, faint mottles of pale brown (10YR 6/3); moderate, medium, subangular blocky structure; firm; few patchy clay films; common, small, black concretions; strongly acid; gradual, wavy boundary.

C—40 to 48 inches +, yellowish-brown (10YR 5/6) silty clay loam; common, medium, faint mottles of pale brown (10YR 6/3); weak, medium, subangular blocky structure; firm; common, small, black concretions and small pebbles; strongly acid.

The Ap horizon in some places is dark grayish brown (10YR 4/2). The B1 horizon is brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4) and is silty clay loam or silt loam. In some places the profile does not have a B1 horizon. The B2 horizon is yellowish brown (10YR 5/6) in some places. A few small pebbles may occur throughout the profile.

The Elk soils occur with Shelbyville, Mercer, and Huntington soils. The Elk soils have a lighter colored surface layer than the Shelbyville soils, which are underlain by a more clayey layer at a depth of about 3 feet. They have a less yellowish B horizon and are better drained than the Mercer soils, which have a mottled fragipan at a depth of about 2 feet. The Elk soils are on stream terraces and have a lighter colored

surface layer than the Huntington soils, which are on stream flood plains.

Elk silt loam, 0 to 2 percent slopes (EIA).—This soil is on long, narrow terraces along major streams.

Included with this soil in mapping are a few small areas of moderately well drained soils and a few small areas that have gentle slopes.

The available moisture capacity is high, and the root zone is deep. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. The organic-matter content is medium, and tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops. The erosion hazard is only slight where row crops are grown. (Capability unit I–3; woodland suitability group 1)

Elk silt loam, 2 to 6 percent slopes (EIB).—This soil is on long, narrow terraces along major streams and, to a minor extent, on gently sloping ridgetops along former runs of these streams. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some areas that have a surface layer that is a mixture of subsoil material and the original surface layer and a few small areas of moderately well drained soils.

The available moisture capacity is high, and the root zone is deep. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. Organic-matter content is medium, and tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–1; woodland suitability group 1)

Elk silt loam, 6 to 12 percent slopes (EIC).—This soil is on long, narrow stream terraces, on convex ridgetops along former runs of these streams, and along drainageways that dissect these areas. Its profile differs from the one described as typical for the series in that the surface layer is brown silt loam that is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are some areas with a surface layer similar to the one described as typical, and a few small areas of moderately well drained soils.

The available moisture capacity is high, and the root zone is deep. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. Organic-matter content is low, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe–1; woodland suitability group 1)

Elk silt loam, 12 to 20 percent slopes (EID).—This soil is along drainageways that dissect stream terraces and on ridgetops along former runs of these streams. Its profile differs from the one described as typical for the series in that the surface layer is brown silt loam that is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are a few, small, severely eroded areas that have a surface layer that is mostly subsoil material. Also included are a few, small, scattered areas of Lowell and Faywood soils.

The available moisture capacity is high, and the root zone is deep. Natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. Organic-matter content is low, but tillage is easy.

Practically all areas are used for crops or pasture. This soil is suited to all commonly grown crops. It is suited to only occasional cultivation because the erosion hazard is very severe where row crops are grown. (Capability unit IVe–1; woodland suitability group 1)

Fairmount Series

The Fairmount series consists of shallow, well-drained soils that formed in residuum derived from limestone. These soils are steep to very steep and are on slopes of V-shaped valleys.

In a typical profile the surface layer is about 10 inches thick. It is very dark grayish-brown silty clay loam in the upper 6 inches and very dark grayish-brown silty clay in the lower part. The subsoil is dark yellowish-brown clay that is underlain by limestone at a depth of about 16 inches.

The Fairmount soils are mildly alkaline and moderate in natural fertility, but they are droughty. Permeability is moderately slow.

Typical profile of a Fairmount silty clay loam (one-fourth mile south of Kentucky River and one-half mile east of Interstate Highway No. 75):

A11—0 to 6 inches, very dark grayish-brown (10YR 3/2) heavy silty clay loam; strong, fine, granular structure; firm; 10 to 25 percent limestone fragments; mildly alkaline; clear, smooth boundary.

A12—6 to 10 inches, very dark grayish-brown (10YR 3/2) silty clay; strong, fine and medium, granular structure; firm; 10 to 25 percent limestone fragments; few, very small fragments of chert; mildly alkaline; clear, smooth boundary.

B—10 to 16 inches, dark yellowish-brown (10YR 4/3) clay; moderate, fine, blocky structure; very firm; 20 to 40 percent limestone fragments; very firm, sticky and plastic; common, very small fragments of chert; mildly alkaline.

R—16 inches +, limestone.

The depth to limestone bedrock ranges from 10 to 20 inches. The A horizon is very dark grayish brown (10YR 3/2), black (10YR 2/1), very dark brown (10YR 2/2), or very dark gray (10YR 3/1) and is silty clay loam or silty clay. The B horizon is very thin in some places. The reaction is neutral to mildly alkaline.

The Fairmount soils occur with the Cynthiana, Faywood, and Lowell soils. They are about the same depth to bedrock as the Cynthiana soils but have a darker colored, thicker A horizon. The Fairmount soils are not so deep to bedrock as the Faywood and Lowell soils, and they have a thinner B horizon and a darker A horizon than those soils.

Fairmount-Rock outcrop complex, 30 to 60 percent slopes (FaF).—The Fairmount soils and Rock outcrop were mapped as a complex because they occur on the same slopes in such intricate patterns that separation is not practical. A Fairmount soil in this complex has the profile described as typical for the Fairmount series. Rock outcrop occupies from 25 to 50 percent of the mapping unit and is mostly in strips across the slope. Rock outcrop is described under the heading "Rock Outcrop."

Included with this complex in mapping are some small areas of Cynthiana soils and a few small areas that are up to 75 percent Rock outcrop.

The Fairmount soils in this complex have a low available moisture capacity and are droughty because the root zone is restricted by limestone at a depth of about 16 inches.

Natural fertility is moderate, reaction is mildly alkaline, and organic-matter content is medium to high. Steep slopes and rock outcrops make the use of modern farm machinery nearly impossible.

Most areas are wooded, but a few areas are used for pasture. The Rock outcrop part of this unit supports very little plant growth. Some small bushes and stunted trees survive in cracks and crevices. The Fairmount soils are not suited to crops or pasture. A better use is woods. (Capability unit VIIe-1; woodland suitability group 12)

Faywood Series

The Faywood series consists of moderately deep, well-drained soils that formed in residuum from limestone. These soils are sloping to moderately steep and are on ridgetops and side slopes.

In a typical profile the surface layer is brown silt loam about 5 inches thick. The subsoil is brown silty clay to a depth of about 14 inches and, to a depth of 30 inches, is yellowish-brown clay that has variegations of brown and pale brown. This is underlain by limestone.

The Faywood soils have moderate natural fertility and are slightly acid to strongly acid. Permeability is moderately slow.

Typical profile of a Faywood silt loam (0.4 mile east of State Route 52 on farm lane, 2 miles south of Richmond):

Ap—0 to 5 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; very friable; many small roots; medium acid; clear, smooth boundary.

B2t—5 to 14 inches, brown (7.5YR 4/4) silty clay; moderate, fine and medium, blocky structure; very firm, sticky and plastic; common to few small roots; common, thin clay films; strongly acid; gradual, smooth boundary.

B3—14 to 30 inches, yellowish-brown (10YR 5/4) clay; many, fine, faint variegations of brown (10YR 4/3) and pale brown (10YR 6/3); weak, fine, blocky structure in upper part, massive in the lower 6 inches; very firm, sticky and plastic; few small roots in upper 6 inches; few, small, black concretions; slightly acid.

R—30 inches +, limestone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. The Ap horizon is dark grayish brown (10YR 4/2), brown (10YR 5/3 or 4/3), or very dark grayish brown (10YR 3/2). The Ap horizon is silty clay loam or silty clay where erosion has been severe. The B2 horizon is yellowish brown (10YR 5/4 or 5/6), or brown (7.5YR 4/4). Variegations in the B3 horizon are light brownish gray (10YR 6/2), strong brown (7.5YR 5/6), brown (10YR 4/3), or pale brown (10YR 6/3).

The Faywood soils occur with Lowell, Caleast, Cynthiana, and Fairmount soils. They are not so deep as the Lowell and Caleast soils, and they have a lighter colored surface layer than the Caleast soils. They are deeper than the Cynthiana and Fairmount soils, which are less than 20 inches to bedrock, and they have a lighter colored A horizon than the Fairmount soils.

Faywood silt loam, 6 to 12 percent slopes (FdC).—This soil is on convex, long, narrow ridgetops and along drainageways that dissect some gentle ridgetops.

Included with this soil in mapping are a few small areas of Cynthiana and Lowell soils. Also included are a few, small, severely eroded areas that are particularly noticeable where a field is plowed.

The available moisture capacity is only moderate because the root zone is somewhat restricted by the clayey subsoil below a depth of 14 inches. Naturally fertility is moderate, and crop response to lime and fertilizer is good. Organic-matter content is low, but this soil is easily tilled.

Practically all areas have been cleared and used for crops and pasture. This soil is suited to most crops and to all hay and pasture plants commonly grown. The erosion hazard is severe where row crops are grown. (Capability unit IIIe-2; woodland suitability group 2)

Faywood silt loam, 12 to 30 percent slopes (FdE).—This soil is along drainageways that dissect the ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas of Cynthiana soils and a few small areas that have flagstones on the surface. Also included are some severely eroded areas that have a surface layer consisting mostly of subsoil material, and a few small areas in which slopes are 6 to 12 percent.

The available moisture capacity is only moderate because the root zone is somewhat restricted by the clayey subsoil below a depth of 14 inches. Natural fertility is moderate, and crop response to lime and fertilizer is fair to good. Organic-matter content is low, but this soil is easily tilled.

Most areas have been used for crops and pasture. This soil is not suited to row crops, and most areas are now used for pasture or hay. It is suited to most commonly grown hay and pasture plants. (Capability unit VIe-1; woodland suitability group 2)

Gullied Land

Gullied land (Gu) consists of soils that are so severely damaged by erosion that their profiles cannot be identified. The soil material is alkaline and consists mostly of soft, calcareous siltstone and shale. Gullies range from 2 to 10 feet in depth, and the ridges between the gullies are very narrow. Gullied land is strongly sloping to steep.

Included in mapping are a few small areas of acid material. These occur in the Knobs area.

Gullied land has been abandoned and either is covered with redcedar and bushes or is bare. Generally, reclamation is not economically practical. Trees are a suitable protective cover. (Capability unit VIIe-2; woodland suitability group 13)

Hagerstown Series

The Hagerstown series consists of deep, well-drained soils that formed in residuum from limestone. These soils are gently sloping to sloping and are on ridgetops.

In a typical profile the surface layer is very dark grayish-brown silt loam about 10 inches thick. The subsoil is reddish-brown silty clay loam to a depth of 15 inches and is yellowish-red, plastic clay to a depth of about 60 inches. It is very firm below a depth of 36 inches and has variegations of yellowish brown and dark red below a depth of 48 inches.

The Hagerstown soils have moderate natural fertility and are medium acid. Permeability is moderate to a depth of 3 feet and is moderately slow below this depth.

Typical profile of a Hagerstown silt loam (2 miles east of Richmond on 4-mile road, one-eighth mile east of Otter Creek, 200 yards north of road):

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable; many roots; medium acid; clear, smooth boundary.

B1t—10 to 15 inches, reddish-brown (5YR 4/4) silty clay loam;

moderate, fine and medium, subangular blocky structure; friable; few clay films; few, small, black concretions; many roots; medium acid; gradual, smooth boundary.

B2t—15 to 36 inches, yellowish-red (5YR 4/6) silty clay, moderate, medium, subangular blocky structure; firm, sticky and plastic; common roots; many clay films; few, small, black concretions; medium acid; gradual, smooth boundary.

B31t—36 to 48 inches, yellowish-red (5YR 5/6) clay; weak, medium, subangular blocky structure; very firm, sticky and plastic; common clay films; common, small, black concretions; medium acid; diffuse, wavy boundary.

B32—48 to 60 inches +, yellowish-red (5YR 5/6) clay; many, medium, distinct variegations of yellowish brown (10YR 5/6) and dark red (2.5YR 3/6); massive; very firm, sticky and plastic; medium acid.

The depth to bedrock ranges from 5 to 7 feet Bedrock is brown dolomitic limestone in most areas. The Ap horizon is very dark grayish brown (10YR 3/2), dark reddish brown (5YR 3/2), or dark brown (10YR 3/3). The B1 horizon is absent in some places; where present, it is reddish brown (5YR 4/4) or brown (7.5YR 4/4). The B2 and B3 horizons are yellowish red (5YR 5/8, 4/8, 4/6, or 5/6) or dark red (2.5YR 3/6).

The Ap horizon of Hagerstown soils in the county is darker than the defined range for the series, but this does not affect the use and behavior of the soils.

The Hagerstown soils occur with Shelbyville and Mercer soils. Hagerstown soils are redder and more clayey in the upper B horizon than the Shelbyville soils. They lack the fragipan of the Mercer soils, and they have a darker colored A horizon and a redder, more clayey B horizon than those soils.

Hagerstown silt loam, 2 to 6 percent slopes (HaB).—This soil is on long, narrow, convex ridgetops. Some areas have small sinks and depressions. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas that have a siltier subsoil than normal for the series.

The available moisture capacity is high, natural fertility is moderate, reaction is medium acid, and crop response to lime and fertilizer is good. Organic-matter content is medium, and this soil is easily tilled.

Practically all areas are used for crops and pasture. This This soil is suited to all commonly grown crops and to all hay and pasture plants, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–1; woodland suitability group 1)

Hagerstown silt loam, 6 to 12 percent slopes (HaC).—This soil is on long ridgetops and along drainageways that dissect the gently sloping ridgetops. Some areas have small sinks and depressions.

Included with this soil in mapping are some areas that have a surface layer that is a mixture of subsoil material and the original surface layer and a few small areas that are severely eroded.

The available moisture capacity is high, and crop response to lime and fertilizer is good. Organic-matter content is medium, and this soil is easily tilled.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and to all hay and pasture plants, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe–1; woodland suitability group 1)

Huntington Series

The Huntington series consists of deep, well-drained soils that formed in alluvium from soils derived primarily from limestone or from mixed sandstone, limestone, and shale. Huntington soils are nearly level and are on flood plains.

In a typical profile the surface layer is dark-brown silt loam about 18 inches thick. The subsoil is brown silt loam to a depth of 44 inches or more.

Typical profile of Huntington silt loam (along State Route 169 about 1 mile northwest of Richmond):

Ap—0 to 9 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; few, small, black concretions; neutral; gradual, smooth boundary.

A1—9 to 18 inches, dark-brown (10YR 3/3) silt loam; weak, fine and medium, granular structure; very friable; few, small, black concretions; neutral; gradual, smooth boundary.

B—18 to 44 inches +, brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; very friable; few, small, black concretions; neutral.

The A horizon ranges from 10 to 24 inches in thickness. In some places the A horizon is very dark grayish brown (10YR 3/2). The B horizon may have some gray mottles below a depth of 30 inches. The reaction is slightly acid to mildly alkaline throughout.

The Huntington soils occur with the Kickapoo, Lindside, and Newark soils. Huntington soils are less sandy throughout than the Kickapoo soils. They are better drained than the Lindside and Newark soils.

Huntington silt loam (0 to 4 percent slopes) (Hu).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few small areas having slopes up to 10 percent. Also included are some areas of well-drained bottom-land soils in the Mountain area that have a lighter colored surface layer than the Huntington soils.

This soil has a high available moisture capacity and high natural fertility. Crop response to fertilizer is good. Permeability is moderate. Reaction is nearly neutral, and lime is generally not needed. Organic-matter content is high, and this soil is easily tilled.

This soil is suited to all commonly grown crops and to all hay and pasture plants. Infrequent flooding occurs mostly during winter and early in spring, but crops are seldom damaged. (Capability unit I–1; woodland suitability group 6)

Kickapoo Series

The Kickapoo series consists of deep, well-drained soils that formed in thick alluvium along narrow strips adjacent to the banks of the Kentucky River. Slopes range mostly from 0 to 4 percent, but in a few, small, scattered areas slopes range up to 10 percent.

In a typical profile the surface layer is dark-brown fine sandy loam about 10 inches thick. The underlying material is brown fine sandy loam that extends to a depth of 48 inches or more.

Typical profile of Kickapoo fine sandy loam (along the Kentucky River at the mouth of Jacks Creek, about 8 miles north-northwest of Richmond):

Ap—0 to 10 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; neutral; clear, smooth boundary.

C1—10 to 20 inches, brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; neutral; gradual, wavy boundary.

C2—20 to 48 inches +, brown (10YR 4/3) fine sandy loam; single grain; loose, very friable; neutral.

The Ap horizon is brown (10YR 4/3) in some areas. In some places the B and C horizons are brown (10YR 5/3) and dark grayish brown (10YR 4/2). In places below a depth of 3 feet, the profile has alternating layers of loamy fine sand, silt loam, and silty clay loam.

The Kickapoo soils occur with Huntington and Lindside soils. Kickapoo soils are more sandy throughout than the Huntington and Lindside soils, and they are better drained than the Lindside soils.

Kickapoo fine sandy loam (0 to 10 percent slopes) (Kp).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few, small, scattered areas that are loamy fine sand to a depth of 4 feet or more.

This soil has a high available moisture capacity and high natural fertility. Crop response to fertilizer is good. Permeability is moderately rapid, and this soil is slightly droughty during prolonged dry periods. Reaction is neutral, and lime is not needed. Organic-matter content is medium, and tillage is easy.

Practically all areas are used for crops or pasture. This soil is suited to most crops and to most hay and pasture plants commonly grown, but flooding, mostly during winter and early in spring, limits the use of some crops, such as small grain. (Capability unit I–1; woodland suitability group 6)

Lawrence Series

The Lawrence series consists of somewhat poorly drained soils that have a fragipan at a depth of about 18 inches. These soils formed in residuum or old alluvium from soils derived from limestone or in mixed alluvium from soils derived from limestone, siltstone, and shale. They are in broad, level areas.

In a typical profile the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil is pale-brown silt loam to a depth of about 11 inches, and below this, it is light yellowish-brown light silty clay loam with grayish mottles to a depth of about 18 inches. Below the subsoil, there is a firm, compact, mottled, light brownish-gray fragipan about 22 inches thick. This is underlain by mottled, light-gray silty clay loam.

Typical profile of Lawrence silt loam (one-fourth mile east of State Route 595 on Glades Road, near Middletown):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint mottles of pale brown (10YR 6/3); weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary.

B1—7 to 11 inches, pale-brown (10YR 6/3) silt loam; weak, fine, blocky structure; friable; common, small, black concretions; very strongly acid; clear, smooth boundary.

B2—11 to 18 inches, light yellowish-brown (10YR 6/4) light silty clay loam; common, fine, faint mottles of light brownish gray (10YR 6/2); weak, medium, blocky structure; friable; common, small, black concretions; very strongly acid; clear, smooth boundary.

Bxt—18 to 40 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, fine, distinct mottles of strong brown (7.5YR 5/6) and light yellowish brown (10YR 6/4); weak, coarse, blocky structure; common, gray clay films and silt coatings; very firm, compact, and brittle; many, small, black concretions; very strongly acid.

Cg—40 to 48 inches +, light-gray (2.5Y 7/2) silty clay loam; common, medium, distinct mottles of yellowish red (5YR 4/6) and strong brown (7.5YR 5/6); massive; firm, sticky and plastic; very strongly acid.

The solum ranges from 3 to 5 feet in thickness, and the depth of bedrock ranges from 4 to 7 feet or more. The depth to the fragipan ranges from 14 to 24 inches. The Ap horizon is grayish brown (2.5Y 5/2) in some places. Colors of the B2 horizon include pale brown (10YR 6/3) and light yellowish brown (10YR 6/4 or 2.5Y 6/4). In some places the B2 horizon is mottled with grayish colors. These soils do not have strong evidence of clay accumulation in the B2 horizon above the fragipan. Colors of the Bx horizon include gray (N 6/0) and light brownish gray (2.5Y 6/2 or 10YR 6/2). The Cg horizon ranges from silty clay loam to silty clay or clay, and it is evenly mottled gray and brown in some places. The most common underlying bedrock is limestone or black shale.

The Lawrence soils occur with the Mercer, Berea, and Robertsville soils. Lawrence soils are not so well drained as the Mercer soils, and they have gray mottles nearer the surface. They are not so poorly drained as the Robertsville soils, which are gray throughout. Lawrence soils are somewhat poorly drained, whereas the Berea soils are moderately well drained and lack a fragipan.

Lawrence silt loam (0 to 4 percent slopes) (Lc).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few small areas that have black shale at a depth of 20 to 40 inches.

This soil has slow permeability and surface runoff, and a seasonal high water table is near the surface during wet periods. The root zone is restricted by the fragipan at a depth of about 18 inches, and the available moisture capacity is moderate. Natural fertility is low, and reaction is very strongly acid. Crop response to lime and fertilizer is fair, but if the soil is adequately drained, response is good. Organic-matter content is low, but tillage is easy when the soil is not too wet.

Most areas are cleared and used for crops and pasture. Unless this soil is drained, crops may be late and damaged by wetness and only water-tolerant plants are suited. Where adequately drained, this soil is suited to most commonly grown crops, but tobacco and alfalfa are subject to damage during wet periods. This soil is well suited to pasture. (Capability unit IIIw–1; woodland suitability group 7)

Lindside Series

The Lindside series consists of moderately well drained, deep soils that formed in alluvium from soils underlain by limestone, siltstone, and shale. Lindside soils are nearly level and are on flood plains of all major streams in the county.

In a typical profile the surface layer is brown silt loam about 7 inches thick. Below the surface layer, to a depth of about 48 inches, is dark grayish-brown silt loam that is mottled with brown and very dark grayish brown below a depth of about 22 inches.

Typical profile of Lindside silt loam (one-half mile south of Tate Creek on Goggins road, 1 mile west of Interstate Highway No. 75):

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, medium, granular structure; very friable; neutral; gradual, smooth boundary.

A1—7 to 22 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; very friable; neutral; gradual, smooth boundary.

B21—22 to 28 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, faint mottles of dark brown (10YR 3/3) and dark grayish brown (2.5Y 4/2); weak, medium, granular structure; friable; neutral; gradual, smooth boundary.

B22g—28 to 48 inches +, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, distinct mottles of brown (7.5YR 4/4) and very dark grayish brown (10YR 3/2); massive; friable; many, small, dark-brown concretions and soft concretionary material; neutral.

The Ap horizon is brown (10YR 4/3), dark brown (10YR 3/3), or dark grayish brown (10YR 4/2). The A1 and B21 horizons are brown (10YR 4/3) or dark grayish brown (10YR 4/2). Depth to the B22g horizon ranges from 20 to 30 inches. In some places the B22g horizon is light brownish gray (10YR 6/2), and in some places it is silty clay loam.

The Lindside soils occur with the Huntington, Newark, and Kickapoo soils. The Lindside soils are less well drained and have a lighter colored A horizon than the Huntington soils, which have no mottling above a depth of 30 inches. They are better drained and mottle free to a greater depth than the Newark soils, which are somewhat poorly drained and have mottling within 10 to 16 inches of the surface. The Lindside soils are less sandy throughout than the Kickapoo soils.

Lindside silt loam (0 to 4 percent slopes) (Ld).—This is the only soil of this series mapped in the county.

The available moisture capacity and natural fertility are high, and reaction is near neutral. Crop response to fertilizer is good, and lime generally is not needed. This soil is moderately well drained, but a seasonal high water table is within 2 to 3 feet of the surface during wet periods. Permeability is moderate. Drainage is not needed for most crops, but it would permit an earlier planting time and reduce danger of damage to crops like alfalfa and tobacco during wet periods. Organic-matter content is medium, and this soil is easily tilled.

Most areas are cleared and used for crops and pasture. This soil is suited to all commonly grown crops and to all hay and pasture plants. It is subject to flooding of short duration, mostly during winter. (Capability unit I–2; woodland suitability group 6)

Lowell Series

The Lowell series consists of deep, well-drained soils that formed in residuum from limestone. These soils are gently sloping and sloping on ridgetops, and they are strongly sloping and moderately steep on side slopes.

In a typical profile the surface layer is brown silt loam about 8 inches thick. The subsoil, about 28 inches thick, is mainly yellowish brown. It is silty clay loam in the upper 4 inches, silty clay in the next 12 inches, and mottled, very sticky, plastic clay in the lower 8 inches. Below the subsoil is mottled, yellowish-brown clay.

The Lowell soils have moderate natural fertility, are strongly acid to medium acid, and have a high available moisture capacity. Permeability is moderate to a depth of 24 inches and slow below this depth.

Typical profile of a Lowell silt loam (one-fourth mile west of Interstate Highway No. 75, one-half mile south of Taylor Fork Creek near farmhouse, about 2 miles south-southwest of Richmond):

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; very friable; many roots; medium acid; clear, smooth boundary.

B1t—8 to 12 inches, dark yellowish-brown (10YR 4/4) silty clay loam; weak, fine, subangular blocky structure; friable; common roots; few clay films; few, small, black concretions; strongly acid; gradual, smooth boundary.

B2t—12 to 24 inches, yellowish-brown (10YR 5/6) silty clay; moderate, medium, blocky structure; firm, sticky and plastic; few roots; common clay films; few, small, black concretions; strongly acid; gradual, smooth boundary.

B3t—24 to 36 inches, yellowish-brown (10YR 5/6) clay; common, fine, faint mottles of light yellowish brown and pale brown; weak, moderate, blocky structure; very firm, very sticky and plastic; few roots; few clay films; few, small, black concretions; strongly acid; gradual, smooth boundary.

C—36 to 48 inches, yellowish-brown (10YR 5/6) clay; many, medium, distinct mottles of light brownish gray and olive brown; massive; extremely firm, very sticky and plastic; strongly acid.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock ranges from 3½ to 7 feet or more. The solum is medium acid to strongly acid, and the C horizon is strongly acid to neutral. Except in severely eroded areas, the A horizon is dark grayish brown (10YR 4/2) or brown (10YR 5/3 or 4/3). In severely eroded areas it commonly is dark yellowish-brown silty clay loam. The B1 and B2 horizons range from 10YR to 7.5YR in hue; they have a value of 4 or 5 and a chroma that ranges from 4 to 6. In places the B3 and C horizons are evenly mottled yellowish brown and light brownish gray. The C horizon has varying amounts of highly weathered siltstone and limestone fragments.

The Lowell soils occur with Faywood, Caleast, and Mercer soils. Lowell soils are deeper than the Faywood soils, which are less than 40 inches to bedrock. The Lowell soils have a lighter colored A horizon and are more acid in the B horizon than the Caleast soils. They lack the fragipan of the Mercer soils and have more clay in the B horizon.

Lawrence silt loam (0 to 4 percent slopes) (Lc).—This soil is on long, narrow, convex ridgetops. Some areas have small sinks or depressions that may be slightly wet at times. A profile of this soil is described as typical for the series.

The available moisture capacity is high, natural fertility is moderate, and crop response to lime and fertilizer is good. The firm, sticky clay layer at a depth of about 2 feet slightly limits root penetration, and water movement and permeability are slow in this layer. The organic-matter content is low, but this soil is easily tilled.

Practically all areas are used for crops or pasture. This soil is suited to all crops and to all hay and pasture plants commonly grown, but the erosion hazard is moderate where row crop are grown. (Capability unit IIe–2; woodland suitabiltiy group 1)

Lowell silt loam, 6 to 12 percent slopes (LwC).—This soil is on convex, long, narrow ridgetops, and along sloping drainageways. Its profile differs from the one described as typical for the series in that the surface layer is about 6 inches thick and is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are a few, small, severely eroded areas that are particularly noticeable as yellowish spots where a field is plowed.

The available moisture capacity is high, and crop response to lime and fertilizer is good. The firm, sticky clay layer at a depth of about 2 feet restricts root penetration slightly, and water movement and permeability are slow in this layer. The organic-matter content is low, but this soil is easy to till.

Practically all areas are used for crops or pasture. This soil is suited to all commonly grown crops and hay and pasture plants, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe–2; woodland suitability group 1)

Lowell silt loam, 12 to 20 percent slopes (LwD).—This soil is in drainageways between ridgetops. Its profile differs from the one described as typical for the series in

that the surface layer is about 6 inches thick and is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are a few, small, severely eroded areas that are particularly noticeable as yellowish spots where a field is plowed. Also included are a few severely eroded areas that have slopes of 6 to 12 percent.

The available moisture capacity is high, and crop response to lime and fertilizer is good. The firm, sticky clay layer at a depth of about 2 feet restricts root penetration slightly, and permeability is slow in this layer. The organic-matter content is low, but this soil is easy to till.

Most areas are used for crops and pasture. This soil is suited to most crops and to most hay and pasture plants commonly grown. It is suited to only occasional cultivation because the erosion hazard is very severe where row crops are grown. (Capability unit IVe–2; woodland suitability group 1)

Lowell silty clay loam, 12 to 30 percent slopes, severely eroded (LyE3).—This soil is on side slopes below ridgetops. Its profile differs from the one described as typical for the series in that the original surface layer has been lost by erosion, and the present surface layer is dark yellowish-brown silty clay loam that is all or mostly all material from the subsoil.

Included with this soil in mapping are some areas that are not severely eroded and have a surface layer that is a mixture of the original surface layer and material from the subsoil.

The available moisture capacity is high, but root penetration is slightly restricted by the firm clay layer at a depth of about 18 inches. Permeability is slow in this layer. A few small gullies are generally present, and tillage is difficult because of the high clay content of the surface layer. Organic-matter content is very low, and good stands of hay and pasture are difficult to obtain.

Practically all areas have been used for crops and pasture but are now used mostly for pasture. A few areas are growing up in brush and woods. This soil is not suited to row crops, but it is suited to most pasture and hay plants. (Capability unit VIe–2; woodland suitability group 3)

McAfee Series

The McAfee series consists of moderately deep, well-drained soils. These soils are sloping and strongly sloping. They occupy ridgetops and upper side slopes between steep, deep valleys, mostly along the northern part of the county near the Kentucky River.

In a typical profile the surface layer is dark-brown silt loam about 7 inches thick. The subsoil is yellowish-red silty clay loam to a depth of about 18 inches and below this, it is brown silty clay to a depth of about 27 inches. It is underlain by limestone.

These soils are medium acid to neutral and have moderate natural fertility. Permeability is moderately slow.

Typical profile of a McAfee silt loam (one-half mile west of Boonesboro rock quarry on ridgetop above the Kentucky River) :

Ap—0 to 7 inches, dark-brown (7.5YR 3/2) silt loam; moderate, fine and medium, granular structure; friable; common small roots; medium acid; clear, smooth boundary.

B21t—7 to 18 inches, yellowish-red (5YR 4/6) heavy silty clay loam; moderate, medium, subangular blocky structure; few small roots; thin, discontinuous, dark reddish-brown clay films; slightly acid; gradual, wavy boundary.

B22t—18 to 27 inches, brown (7.5YR 4/4) heavy silty clay; few yellowish-brown (10YR 5/4) variegations; moderate, medium, blocky structure; very firm; discontinuous clay films; few dark-brown concretions; neutral; abrupt, irregular boundary.

R–27 inches +, limestone.

The depth to limestone bedrock ranges from 20 to 40 inches. The Ap horizon is dark brown (7.5YR 3/2), very dark grayish brown (10YR 3/2), or brown (10YR 4/3). The B horizon is reddish brown (5YR 4/4) in some places. The Ap and B21 horizons are medium acid to slightly acid, and the B22 horizon is slightly acid to neutral.

The McAfee soils occur with Hagerstown and Cynthiana soils. McAfee soils are not so deep to bedrock as the Hagerstown soils, and they are very firm in the B2 horizon. They are deeper and are redder in the B horizon than the Cynthiana soils. The McAfee and Faywood soils are similar in depth to bedrock, but the Faywood soils have a lighter colored A horizon and are less red in the B horizon.

McAfee silt loam, 6 to 12 percent slopes (MnC).—This soil is on long, narrow ridgetops between steep, wide valleys. Some areas have small sinks and depressions. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas of Faywood soils and a few areas that have a surface layer that is a mixture of subsoil material and the original surface layer.

The available moisture capacity is only moderate because the root zone is restricted by rock at a depth of about 27 inches. The organic-matter content is medium, crop response to lime and fertilizer is good, and the soil is easily tilled.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and hay and pasture plants; however, because the erosion hazard is very severe when row crops are grown, the soil is suited to only occasional cultivation. (Capability unit IVe–3; woodland suitablility group 2)

McAfee silt loam, 12 to 20 percent slopes (MnD).—This soil is in the heads of valleys between ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is brown silt loam that is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are a few areas of Faywood and Hagerstown soils and an occasional small area of flagstones or rock outcrop. Also included are a few areas that are severely eroded and have a surface layer consisting mostly of subsoil material. Some of these have slopes of 6 to 12 percent.

The available moisture capacity is only moderate because the root zone is restricted by limestone at a depth of about 24 inches. The organic-matter content is low, crop response to lime and fertilizer is good, and tillage is easy.

Most areas have been used for crops and pasture, but this soil is not suited to crops. It is well suited to hay or pasture, and most areas are now used for pasture. A few small areas remain wooded. (Capability unit VIe–1; woodland suitability group 2)

Melvin Series

The Melvin series consists of poorly drained soils that formed in alluvium washed from soils derived from limestone, shale, and siltstone. Melvin soils are in thick alluvial deposits in low-lying, level or depressed areas of stream flood plains.

In a typical profile the surface layer, about 6 inches thick, is grayish-brown silt loam mottled with yellowish brown. The subsoil, to a depth of about 24 inches, is gray silt loam mottled with olive brown. Below this, the subsoil is gray silty clay loam to a depth of about 48 inches.

Typical profile of Melvin silt loam (one mile west of the Estill County line on south side of State Route 594):

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; common, fine, faint mottles of yellowish brown (10YR 5/4); weak, fine, granular structure; friable; many small roots; slightly acid; clear, smooth boundary.

B21g—6 to 24 inches, gray (10YR 5/1) silt loam; few, fine, faint mottles of olive brown (2.5Y 4/4); weak, fine, granular structure; friable; few small roots; slightly acid; gradual, smooth boundary.

B22g—24 to 48 inches +, gray (5Y 5/1) silty clay loam; common, fine, faint mottles of olive brown (2.5Y 4/4); massive; firm, slightly sticky and plastic; slightly acid.

The Ap horizon is grayish brown (2.5Y 5/2 or 10YR 5/2) or light brownish gray (10YR 6/2). The B horizon is gray (10YR 5/1) or dark gray (10YR 4/1) and, in some places, has mottles of yellowish brown (10YR 5/6). Reaction is strongly acid to neutral throughout.

The Melvin soils occur with Newark and Dunning soils. The Melvin soils are more poorly drained than the Newark soils, and they are gray nearer the surface. They have a thinner and lighter colored A horizon than the Dunning soils.

Melvin silt loam (0 to 2 percent slopes) (Mt).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few small areas that have a silty clay loam surface layer and subsoil.

Plant growth is limited by a seasonal high water table that is 0 to 6 inches from the surface for appreciable periods. The natural soil drainage is poor, but the permeability is moderate, and tile drainage systems work well. The available moisture capacity is high, natural fertility is moderate, and reaction is strongly acid to neutral. Crop response to fertilizer is good. Crop response to lime is good in areas that have medium or stronger acidity. Organic-matter content is low, but tillage is easy.

Cleared areas are used mostly for pasture. Many areas are wooded. Drained areas are suited to some commonly grown crops, except for tobacco and alfalfa. These soils are subject to flooding. (Capability unit IIIw-2; woodland suitability group 7)

Mercer Series

The Mercer series consists of moderately well drained soils that have a fragipan at a depth of about 2 feet. These soils are nearly level to sloping and are on wide ridgetops and stream terraces.

In a typical profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil is mainly yellowish brown to a depth of about 22 inches. It is silt loam in the upper part and silty clay loam in the lower part. Below the subsoil is a fragipan that is about 20 inches thick and consists of mottled yellowish-brown, light brownish-gray, and strong-brown silty clay loam. It is very firm and compact. The fragipan is underlain by mottled brownish and grayish silty clay.

Typical profile of a Mercer silt loam (one-fourth mile north of Kirksville on State Route 595):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.

B1—8 to 13 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine subangular blocky structure; friable; few, small, black concretions; many roots; strongly acid; gradual, smooth boundary.

B2t—13 to 22 inches, yellowish-brown (10YR 5/4) light silty clay loam; common, medium, faint mottles of pale brown (10YR 6/3) and strong brown (7.5YR 5/6); moderate, medium, blocky structure; friable to firm; few clay films; common, small, black concretions; common roots; strongly acid; clear, smooth boundary.

Bxt—22 to 42 inches, mottled yellowish-brown (10YR 5/4), light brownish-gray (10YR 6/2), and strong-brown (7.5YR 5/6) silty clay loam; mottles are medium and distinct; moderate, medium, subangular blocky structure; very firm, compact, and brittle; common clay films; many, small and medium, black concretions and soft concretionary material; strongly acid; gradual, wavy boundary.

C—42 to 60 inches +, mottled strong-brown (7.5YR 5/6), dark yellowish-brown (10YR 4/4), and light brownish-gray (10YR 6/2) silty clay; massive; very firm, sticky and plastic; medium acid.

The depth to bedrock ranges from 5 to 6 feet or more. Bedrock is limestone or siltstone. The solum ranges from 30 to 42 inches in thickness. The depth to the fragipan ranges from 18 to 26 inches. Reaction of the solum is medium acid to strongly acid. Except in severely eroded areas, the Ap horizon is brown (10YR 4/3), very dark grayish brown (10YR 3/2), or dark grayish brown (10YR 4/2). It is dark yellowish-brown silty clay loam in severely eroded areas. The B1 horizon is absent in some areas. The B2 horizon ranges from 7.5YR to 2.5Y in hue and from 4 to 6 in chroma and value. In places a few gray mottles are in the lower part. The B2 horizon is heavy silt loam or light silty clay loam. In places the Bx horizon is dominantly gray with a hue of 10YR or 2.5Y, a value that ranges from 5 to 7, and a chroma of 1 or 2. Its less dominant brownish color ranges from 7.5YR to 2.5Y in hue, from 4 to 6 in value, and from 4 to 8 in chroma. The Bx horizon is heavy silt loam or silty clay loam. The C horizon has layers of soft sandstone in some places. On stream terraces the C horizon is heavy silt loam or silty clay loam and contains layers or pockets of sand or gravel. It is clay in some places on uplands.

The Mercer soils are associated with Lowell, Nicholson, Shelbyville, and Lawrence soils. Mercer soils are not so well drained as the Lowell and Shelbyville soils, which lack a fragipan. The fragipan of Mercer soils is nearer the surface and is more firm and compact than in the Nicholson soils, and the gray colors are at a lesser depth in the Mercer soils. Mercer soils have gray mottles beginning at a greater depth than the Lawrence soils.

Mercer silt loam, 0 to 2 percent slopes (MuA).—This soil is on broad flats, ridgetops, and stream terraces. Included with this soil in mapping are a few small, somewhat poorly drained areas.

The available moisture capacity is only moderate because the root zone is restricted by the fragipan at a depth of about 24 inches. During rainy periods, wetness is a limitation because of the slow permeability of the fragipan and slow surface runoff. Crop response to lime and fertilizer is good. Organic-matter content is medium, and this soil is easily tilled.

Practically all areas have been used for crops and pasture. This soil is suited to most commonly grown crops and to most hay and pasture plants, but seasonal wetness may damage alfalfa and tobacco and delay planting time. (Capability unit IIw-1; woodland suitability group 8)

Mercer silt loam, 2 to 6 percent slopes (MuB).—This soil is on wide, convex ridgetops and on stream terraces. Some areas have small sinks and depressions that are slightly wet during rainy periods. A profile of this soil is described as typical for the series.

The available moisture capacity is only moderate because the root zone is restricted by the fragipan at a depth of about 24 inches. Crop response to lime and fertilizer is good. Organic-matter content is medium, and this soil is easily tilled.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops and hay and pasture plants, but the erosion hazard is moderate where row crops are grown. Alfalfa and tobacco may be slightly damaged during wet periods because of slow internal drainage. (Capability unit IIe-3; woodland suitability group 8)

Mercer silt loam, 6 to 12 percent slopes (MuC).—This soil is on areas along drainageways that dissect the wide ridgetops and broad flats. Its profile differs from the one described as typical for the series in that the surface layer is brown silt loam that is a mixture of subsoil material and the original surface layer and the fragipan is at a slightly shallower depth.

Included with this soil in mapping are a few small areas that are severely eroded and have a surface layer that is all or mostly material from the subsoil.

The available moisture capacity is only moderate because the root zone is restricted by the fragipan at a depth of about 20 inches. Crop response to lime and fertilizer is good. Organic-matter content is low, and this soil is easily tilled.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops and hay and pasture plants, but the erosion hazard is severe where row crops are grown. Alfalfa is not well suited, because of the restricted root zone and a high water table during wet periods. (Capability unit IIIe-3; woodland suitability group 8)

Mercer silty clay loam, 6 to 12 percent slopes, severely eroded (MvC3).—This soil is on areas along drainageways that dissect the wide ridgetops and broad flats. Its profile differs from the one described as typical in that the surface layer is dark yellowish-brown silty clay loam which is all or mostly subsoil material and the fragipan is at a shallower depth.

The available moisture capacity is low because the root zone is restricted by the fragipan at a depth of about 18 inches. Tillage is somewhat difficult because the organic-matter content is very low and the surface layer has a higher content of clay than the uneroded Mercer soils. Response to lime and fertilizer is fair, but good stands of crops or pasture plants are somewhat difficult to obtain.

Practically all areas are used for crops and pasture. This soil is suited to some crops, but growth is only fair, and the erosion hazard is very severe where row crops are grown. The soil is suitable for occasional cultivation but is better suited to hay and pasture crops. (Capability unit IVe-6; woodland suitability group 9)

Monongahela Series

The Monongahela series consists of moderately well drained soils that have a compact fragipan at a depth of about 20 inches. These soils are nearly level to sloping and are on high ridgetops and along sloping drainageways that dissect the ridgetops, between steep, deep, V-shaped valleys of the drainageways of larger streams. They formed in alluvial material from former runs of the Kentucky River.

In a typical profile the surface layer is grayish-brown fine sandy loam about 7 inches thick. It is underlain by the subsoil that is yellowish-brown loam to a depth of about 20 inches. Below this depth is a compact fragipan of light brownish-gray clay loam that grades to loam and is mottled with yellowish brown, gray, strong brown, and brownish yellow.

The Monongahela soils are low in natural fertility and are very strongly acid. Permeability is moderate to a depth of 20 inches and slow below this depth.

Typical profile of a Monongahela fine sandy loam (one-half mile southwest of College Hill on the Waco Road):

Ap—0 to 7 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, medium, granular structure; very friable; many small roots; very strongly acid; clear, smooth boundary.

B2—7 to 20 inches, yellowish-brown (10YR 5/4) loam; few, fine, faint mottles of light brownish gray in the lower third; weak, medium, blocky structure; very friable; common small roots; very strongly acid; clear, smooth boundary.

Bx1—20 to 28 inches, light brownish-gray (2.5Y 6/2) light clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and gray (N 5/0); moderate, medium, blocky structure; firm, compact, and brittle; common clay films and silt coatings; few, small, black concretions; very strongly acid; gradual, smooth boundary.

Bx2—28 to 48 inches +, light brownish-gray (2.5Y 6/2) loam; common, medium, distinct mottles of brownish yellow (10YR 6/6) and light yellowish brown (2.5Y 6/4); weak, medium and coarse, blocky structure; firm, compact, and brittle; few clay films and silt coatings; few, small, black concretions; very strongly acid.

The depth to bedrock is generally about 6 feet, but where slopes are 6 to 12 percent, it is 3 feet in places. In most places bedrock is black shale. The solum ranges from 36 to 54 inches in thickness. Reaction is extremely acid in some places. The Ap horizon is brown (10YR 4/3) or grayish brown (2.5Y 5/2 or 10YR 5/2). The B2 horizon is light olive brown (2.5Y 5/4) or yellowish brown (10YR 5/4). The Bx horizon is pale yellow (10YR 7/4), grayish brown (2.5Y 5/2) or 10 YR 5/2), or light brownish gray (2.5Y 6/2). The B horizon is loam, clay loam, or silty clay loam. These soils do not have strong evidence of clay accumulation in the horizon above the fragipan.

The Monongahela soils occur with Mercer, Lawrence, and Tate soils. The Monongahela soils are similar to the Mercer soils, but the Monongahela soils have more sand throughout. They are better drained, have gray colors at a greater depth, and contain more sand than the Lawrence soils. The Monongahela soils are less well drained than the Tate soils, which lack a fragipan.

Monongahela fine sandy loam, 0 to 2 percent slopes (MwA).—This soil is on wide ridgetops. Included with this soil in mapping are a few small areas that have a loam or silt loam surface layer, and a few small areas of somewhat poorly drained soils.

The slow surface runoff and the slow permeability of the fragipan cause a moderate wetness limitation. During wet periods a seasonal high water table is at a depth of about 1 foot. The available moisture capacity is only moderate because root penetration is restricted by the fragipan at a depth of about 20 inches. Crop response to lime and fertilizer is good. The organic-matter content is low, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to most crops and hay and pasture plants commonly grown. Tobacco and alfalfa are not well suited, because of a seasonal high water table and limited root zone caused by the fragipan. (Capability unit IIw–1; woodland suitability group 8)

Monongahela fine sandy loam, 2 to 6 percent slopes (MwB).—This soil is on convex, long, narrow ridgetops. A few areas have small sinks or depressions that are slightly wet at times. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas with a surface layer that is a mixture of subsoil material and the original surface layer, and a few, small, scattered areas that have a loam or silt loam surface layer.

The root zone is restricted by the fragipan at a depth of about 20 inches, and the available moisture capacity is only moderate. Crop response to lime and fertilizer is good. The organic-matter content is low, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops and hay and pasture plants, but the erosion hazard is moderate where row crops are grown. Tobacco and alfalfa are subject to damage by a seasonal high water table. (Capability unit IIe–3; woodland suitability group 8)

Monongahela fine sandy loam, 6 to 12 percent slopes (MwC).—This soil is in areas along drainageways that dissect the ridgetops and on long, narrow, convex ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is brown fine sandy loam that is a mixture of the original surface layer and material from the subsoil, and the fragipan is at a depth of about 17 inches.

Included with this soil in mapping are a few small, uneroded areas and a few small areas that have a surface layer consisting mostly of subsoil material and that are noticeable as yellowish spots where a field is plowed.

The root zone is restricted by the fragipan at a depth of about 17 inches, and the available moisture capacity is only moderate. Crop response to lime and fertilizer is good. Organic-matter content is low, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to most commonly grown crops and hay and pasture plants, but the erosion hazard is severe where row crops are grown. Tobacco and alfalfa are subject to damage because of the restricted root zone. (Capability unit IIIe–3; woodland suitability group 8)

Newark Series

The Newark series consists of somewhat poorly drained soils that formed in alluvium washed from soils derived from limestone, shale, and siltstone. These soils are nearly level and are on flood plains along most major streams.

In a typical profile the surface layer is dark grayish-brown silt loam about 16 inches thick. Below this, to a depth of about 48 inches, is heavy silt loam that is dark grayish brown in the upper part and gray in the lower part.

Typical profile of Newark silt loam (2½ miles southeast of Moberly on the north side of Muddy Creek):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; neutral; gradual, smooth boundary.

A1—8 to 16 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; few, very small, dark yellowish-brown (10YR 4/4) concretions; neutral; clear, smooth boundary.

Bg—16 to 32 inches, dark grayish-brown (10YR 4/2) heavy silt loam; many, fine, distinct mottles of dark yellowish brown (10YR 4/4); weak, fine, granular structure; friable; neutral; gradual, smooth boundary.

Cg—32 to 48 inches +, gray (10YR 5/1) heavy silt loam; common, medium, distinct mottles of dark yellowish brown (10YR 4/4); massive; friable to firm; neutral.

The A horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3). The Bg horizon is dark grayish brown (10YR 4/2), light brownish gray (10YR 6/2), or grayish brown (2.5Y 5/2). Mottles are dark yellowish brown (10YR 4/4), light olive brown (2.5Y 5/6), or strong brown (7.5YR 5/6). The Bg horizon ranges from silt loam to light silty clay loam. Small black concretions are common in some places. Reaction is slightly acid to mildly alkaline throughout the solum.

The Newark soils occur with Huntington, Lindside and Melvin soils. The Newark soils are not so well drained as the Huntington and Lindside soils. The Newark soils are better drained and are less gray below the A horizon than the Melvin soils.

Newark silt loam (0 to 4 percent slopes) (Ne).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few small areas that have a silty clay loam surface layer.

A seasonal high water table is at a depth of about ½ to 1½ feet during wet periods and restricts the root zone for appreciable periods. Surface runoff is slow, but permeability is moderate and tile drainage works well. The available moisture capacity is high, organic-matter content is medium, and tillage is easy. Natural fertility is moderate, and crop response to fertilizer is good. Reaction is near neutral, and lime is generally not needed.

Most areas are used for crops and pasture. After adequate drainage, this soil is suited to most commonly grown crops and hay and pasture plants, but during wet growing seasons, crops like tobacco and alfalfa may be damaged by a high water table. This soil is subject to flooding, mostly during winter and early in spring. (Capability unit IIw-2; woodland suitability group 7)

Nicholson Series

The Nicholson series consists of moderately well drained to well drained soils that have a fragipan. These soils are gently sloping and sloping and are on rather wide, convex ridgetops and along sloping drainageways that dissect these ridgetops. They formed in a mixed residuum from siltstone and limestone, possibly with some influence from loess.

In a typical profile the surface layer is brown silt loam about 7 inches thick. Below this, to a depth of about 29 inches, is brown silty clay loam. This is underlain by a compact, brown and gray silty clay loam fragipan that extends to a depth of about 47 inches. The underlying material is mottled yellowish-brown and gray silty clay.

The Nicholson soils have moderate natural fertility and are strongly acid. Permeability is moderate to a depth of 29 inches and is slow below this depth.

Typical profile of a Nicholson silt loam (0.9 mile north and 0.2 mile west of county road intersection that is 1¼ miles east-southeast of Redhouse):

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; very friable; strongly acid; common small roots; clear, smooth boundary.

B2t—15 to 29 inches, brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; friable; few, small, dark concretions; few small roots; very strongly acid; gradual, smooth boundary.

B2t—15 to 29 inches, brown (7.5YR 4/4) silty clay loam; few, fine, faint mottles of pale brown (10YR 6/3) in lower 2 or 3 inches; moderate, medium, subangular and angular blocky structure; friable; few, thin, discontinuous clay films; common, small, black concretions; few small roots; very strongly acid; abrupt, smooth boundary.

Bx1—29 to 42 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; common, fine and medium, faint mottles of pale brown (10YR 6/3) and common, fine and medium, distinct mottles of light brownish gray and light gray; moderate, medium, blocky structure; firm and compact, slightly sticky when wet; thin, discontinuous clay films on some ped faces; common, small, black concretions; very strongly acid; gradual, wavy boundary.

Bx2—42 to 47 inches, mottled pale-brown (10YR 6/3), dark yellowish-brown (10YR 4/4), yellowish-brown (10YR 5/4), and light-gray (10YR 7/2) silty clay loam; moderate, medium, angular blocky structure; firm and compact, sticky when wet; clay films on some ped surfaces; common, small, black concretions; very strongly acid; gradual, wavy boundary.

C—47 to 52 inches +, mottled yellowish-brown (10YR 5/4), light brownish-gray (10YR 6/2), and light-gray (10YR 7/2) silty clay; strong, medium, subangular blocky stucture; very firm, sticky and plastic; many, medium to large, irregular shaped, black concretions; very strongly acid.

The depth to bedrock ranges from 5 to 7 feet or more. The solum ranges from 3½ to 5 feet in thickness. The Ap horizon is brown (10YR 4/3), dark brown (10YR 3/3), or dark grayish brown (10YR 4/2). The B1 horizon is brown (7.5YR 4/4) or dark yellowish brown (10YR 4/4). This horizon is absent in some places. The B2 horizon is strong brown (7.5YR 5/6), brown (7.5YR 4/4), or yellowish brown (10YR 5/4). The depth to the Bx horizon ranges from 26 to 35 inches.

The Nicholson soils occur with Shelbyville, Lowell, and Mercer soils. The Nicholson soils have a lighter colored A horizon than the Shelbyville soils, which lack a fragipan. The Nicholson soils have a less clayey B horizon than the Lowell soils, which lack a fragipan. The Nicholson soils are less yellow in the B horizon and have a fragipan at a greater depth than the Mercer soils.

Nicholson silt loam, 2 to 6 percent slopes (NhB).—This soil is on rather wide, convex ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few small areas that have a surface layer that is a mixture of subsoil material and the original surface layer. Also included are a few small areas of Mercer soils that occur at the heads of drains and in slight depressions.

The root zone is slightly restricted by the fragipan at a depth of about 30 inches, but the available moisture capacity is high. Crop response to lime and fertilizer is good. The organic-matter content is medium, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all crops and all hay and pasture plants commonly grown, but the erosion hazard is moderate where row crops are grown. Some of the deeper rooting crops, such as alfalfa, may be slightly damaged by a seasonal high water table caused by the slow permeability of the fragipan. (Capability unit IIe–2; woodland suitability group 1)

Nicholson silt loam, 6 to 12 percent slopes (NhC).—This soil is along drainageways that dissect ridgetops and on convex ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are a few, small, severely eroded areas that are particularly noticeable as redder spots where a field is plowed. Also included are a few areas with a surface layer similar to that described as typical and a few, small, scattered areas that have slopes of 12 to 20 percent.

The root zone is slightly restricted by the fragipan at a depth of about 26 inches, but the available moisture capacity is moderate. Crop response to lime and fertilizer is good. The organic-matter content is low, but tillage is easy.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and hay and pasture plants, but the erosion hazard is severe where row crops are grown. Some of the deeper rooting crops, such as alfalfa, may be slightly damaged by a seasonal high water table caused by slow permeability of the fragipan. (Capability unit IIIe–2; woodland suitability group 1)

Opequon Series

The Opequon series consists of shallow, well-drained soils that formed in residuum from massive, hard, gray limestone and soft, lemon-colored limestone. These soils are strongly sloping and moderately steep and are on mountain ridgetops. In Madison County the Opaquon soils were mapped only in a complex with Rock outcrop.

In a typical profile the surface layer, about 6 inches thick, is very dark grayish-brown silt loam in the upper half and is brown silt loam in the lower half. The subsoil is yellowish-red silty clay loam to a depth of about 12 inches and yellowish-red silty clay to a depth of 18 inches. It is underlain by yellowish-red clay. Limestone bedrock is at a depth of about 20 inches.

The Opequon soils have a low available moisture capacity and moderately slow permeability.

Typical profile of an Opequon silt loam (Bear Mountain, 2½ miles southeast of Berea, on ridgetop one-half mile east of the old Scaffold Cane School):

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; many small roots; medium acid; clear, smooth boundary.

A2—3 to 6 inches, brown (10YR 4/3) silt loam; weak, medium, granular structure; very friable; many small roots; medium acid; clear, smooth boundary.

B21t—6 to 12 inches, yellowish-red (5YR 4/6) heavy silty clay loam; moderate, medium, blocky structure; firm; common medium and small roots; common thin clay films; few small chert fragments; medium acid; gradual, smooth boundary.

B22t—12 to 18 inches, yellowish-red (5YR 4/6) silty clay; moderate, fine and medium, blocky structure; very firm, sticky and plastic; common roots; common thin clay films; few small chert fragments; medium acid; gradual, smooth boundary.

C—18 to 20 inches, yellowish-red (5YR 4/6) clay; many, medium, distinct variegations of olive brown (2.5Y 4/4); massive; very firm, sticky and plastic; common small roots; common small chert fragments; medium acid.

R—20 inches +, gray, massive limestone.

Thickness of the solum and the depth to bedrock range from 10 to 20 inches. Reaction of the solum is medium acid to slightly acid. The A horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3). The B horizon is yellowish red (5YR 4/6), strong brown (7.5YR 5/6), and dark red (2.5YR 3/6). It is silty clay or clay in the lower part. The C horizon

may be calcareous or may contain calcareous, yellowish limestone fragments.

The Opequon soils occur with Cynthiana soils. They have the same depth range as the Cynthiana soils, but they have a redder B horizon.

Otway Series

The Otway series consists of well-drained soils that formed in marl-like residuum from calcareous siltstone and shale. These soils are sloping to steep and are partly on convex, very narrow ridgetops but mostly on the sides of V-shaped valleys between ridgetops.

In a typical profile the surface layer is very dark grayish-brown silty clay about 7 inches thick. The subsoil is dark grayish-brown silty clay loam to a depth of about 14 inches. It is underlain by olive-gray silty clay loam to a depth of about 24 inches. Below this is greenish-gray, highly weathered siltstone and shale that extend to bedrock at a depth of about 38 inches.

The Otway soils are high in natural fertility and are alkaline. Permeability is moderately slow.

Typical profile of an Otway silty clay (1⅛ miles south of White Hall, 1⅛ miles east of Interstate Highway No. 75, 250 feet east of county road):

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine, granular structure; friable to firm; mildly alkaline; clear, smooth boundary.

B—7 to 14 inches, dark grayish-brown (2.5Y 4/2) heavy silty clay loam; moderate, fine and medium, blocky structure; firm; few shiny pressure faces; 5 to 15 percent small, calcareous siltstone fragments; moderately alkaline; clear, smooth boundary.

C1—14 to 24 inches, olive-gray (5Y 5/2) and light olive-gray (5Y 6/2) heavy silty clay loam; massive; firm, sticky and plastic; 10 to 25 percent light olive-brown (2.5Y 5/4), soft siltstone and shale fragments; calcareous; gradual, wavy boundary.

C2—24 to 38 inches, greenish-gray (5GY 6/1), soft, calcareous siltstone and shale; few, light olive-brown (2.5Y 4/6) variegations; crushed texture is silty clay loam.

R—38 inches +, hard layers of limestone, siltstone, and shale.

The solum ranges from 12 to 18 inches in thickness. The depth to bedrock ranges from 20 to 40 inches. The A horizon is very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), or black (10YR 2/1). The B horizon is dark grayish brown (2.5Y 4/2), light yellowish brown (2.5Y 6/4), or olive (5Y 5/4). The B and C horizons are heavy silty clay loam, silty clay, or clay loam. The solum is mildly alkaline to moderately alkaline and is calcareous in some places.

The Otway soils occur with Beasley, Brassfield, and Fairmount soils. Otway soils have a darker colored A horizon than the Brassfield and Beasley soils, and they are less coarse in texture throughout than the Brassfield soils. They have a thinner solum than the Beasley soils. The Otway soils are deeper than the Fairmount soils, which formed in residuum dominantly from limestone.

Otway silty clay, 6 to 12 percent slopes (OtC).—This soil is on convex, long, very narrow ridgetops. Included with this soil in mapping are some areas that have a surface layer that is up to 20 percent limestone and siltstone fragments.

The root zone is restricted at a depth of about 24 inches by the soft siltstone and shale layer, and the available moisture capacity is only moderate. Organic-matter content is high, but tillage is rather difficult because of the silty clay surface layer. Plant response to fertilizer is fair to poor; lime is not needed.

Most areas are used for pasture, but a few small areas are in woods. This soil is suited to occasional cultivation, but it is better suited to hay crops and pasture. The erosion hazard is very severe where this soil is used for cultivation. (Capability unit IVe-3; woodland suitability group 4)

Otway silty clay, 12 to 30 percent slopes (OtE).—This soil is on the sides of V-shaped valleys between ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some areas that have a surface layer that is up to 20 percent limestone and siltstone fragments. Also included are a few scattered areas of soils that have a dark surface layer but are underlain by calcareous clay shale.

The root zone is restricted by the soft siltstone and shale layer at a depth of about 24 inches, and the available moisture capacity is only moderate. Organic-matter content is high, but tillage is rather difficult because of the silty clay surface layer. Crop response to fertilizer is fair to poor; lime is not needed.

Most areas are used for pasture, but some areas are in woods. This soil is suited to most commonly grown hay and pasture plants, but it is not suited to row crops, because of steep slopes and the hazard of erosion. (Capability unit VIe-1; woodland suitability group 4)

Otway silty clay, 30 to 50 percent slopes (OtF).—This soil is on the sides of deep, V-shaped valleys between ridgetops. Its profile differs from the one described as typical for the series in that the depth to bedrock is about 24 inches.

Included with this soil in mapping are some small areas of Fairmount and Brassfield soils. Also included are a few areas of soils that have a dark surface layer but are underlain by calcareous clay shale.

The root zone is restricted by the soft siltstone and shale layer at a depth of about 18 inches, and the available moisture capacity is low to moderate. Surface runoff is rapid, and this soil is somewhat droughty. Steep slopes make the establishment and maintenance of pasture difficult. Crop response to fertilizer is poor; lime is not needed.

Some areas are wooded, some are used for pasture, and some are grown up in bushes or are reverting to woods. This soil is suited to drought-resistant pasture plants, but slope makes the use of modern farm machinery very hazardous. (Capability unit VIIe-1; woodland suitability group 4)

Rarden Series

The Rarden series consist of moderately deep, well drained to moderately well drained soils that formed in residuum from acid clay shale. These soils are sloping and strongly sloping and are on long, narrow ridgetops and on toe slopes at the foot of some steep mountains.

In a typical profile the surface layer is brown heavy silt loam about 5 inches thick. This layer has some strong-brown variegations. The subsoil, to a depth of about 9 inches, is brown silty clay loam and, to about 19 inches, is clay that is variegated with shades of brown, red, and gray. Below the subsoil, to a depth of about 38 inches, is clay in shades of red, olive, and gray. This is underlain by olive shale.

The Rarden soils are low in natural fertility, are very strongly acid, and have a slow permeability.

Typical profile of a Rarden silt loam (1 mile south of Berea on the Berea College poultry farm):

Ap—0 to 5 inches, brown (10YR 5/3) heavy silt loam; common, fine, distinct variegations of strong brown (7.5YR 5/6); weak, medium, subangular blocky and granular structure; friable; many small roots; very strongly acid; clear, smooth boundary.

B1t—5 to 9 inches, brown (10YR 5/3) silty clay loam; few, fine, distinct variegations of red (2.5YR 4/6); moderate, medium, subangular and angular blocky structure; firm; few thin clay films; common small roots; very strongly acid; gradual, smooth boundary.

B2t—9 to 19 inches, variegated strong-brown (7.5YR 5/6), red (2.5YR 4/6), yellowish-red (5YR 5/6), light olive-brown (2.5Y 5/4), and olive-gray (5Y 5/2) clay; strong, medium, angular blocky structure; very firm; thin, discontinuous clay films; few small roots; very strongly acid; gradual, smooth boundary.

C—19 to 38 inches, variegated yellowish-red (5YR 5/6), olive (5Y 5/3), light brownish-gray (2.5Y 6/2) and strong-brown (7.5YR 5/6) clay; massive; very firm, sticky and plastic; 5 to 15 percent small pieces of soft, olive, partially weathered shale; thin lenses of yellowish-brown sandstone; very strongly acid.

R—38 inches +, slightly weathered, olive shale; thin lenses of yellowish-brown, fine-grained sandstone; very strongly acid.

The depth to bedrock ranges from 20 to 40 inches. The solum ranges from 15 to 30 inches in thickness. In wooded areas the profile has a thin, dark-gray (10YR 3/1) silt loam A1 horizon and a brown (10YR 5/3) silt loam A2 horizon. In some places the B2 horizon is strong brown (7.5YR 5/6) or yellowish red (5YR 5/6) with variegations of red and olive gray. In some places the profile does not have a B1 horizon. In some places the C horizon is dominantly olive (5Y 5/3) or light brownish gray (2.5Y 6/2) with variegations of strong brown and yellowish red.

The Rarden soils occur with Rockcastle and Shelocta soils. Rarden soils are more red in the B horizon and have a thicker solum than the Rockcastle soils. They are more shallow, have a more clayey subsoil, and have less rock fragments throughout than the Shelocta soils.

Rarden silt loam, 6 to 12 percent slopes (RaC).—This soil is on long, narrow, convex ridgetops and on toe slopes at the foot of some mountains. It has a surface layer that is a mixture of subsoil material and the original surface layer. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some wooded areas that have a dark-gray silt loam surface layer about 1 inch thick and a brown silt loam subsurface layer about 4 inches thick, instead of a mixed surface layer. Also included are a few, small, scattered areas having slopes of 2 to 6 percent.

The root zone is restricted at a depth of about 20 inches by the clay layer, and the available moisture capacity is only moderate. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is fair.

Most areas have been cleared and used for crops and pasture, but one-fourth to one-half of this acreage has reverted to woods. This soil is suited to occasional cultivation, but the erosion hazard is very severe where row crops are grown. It is better suited to hay and pasture. (Capability unit IVe–4; woodland suitability group 10)

Rarden silt loam, 12 to 20 percent slopes, eroded (RaD2).—This soil is on toe slopes of some mountains.

Included with this soil in mapping are some areas that have been covered by 6 to 12 inches of silty colluvial material with up to 15 percent gravel and rock fragments that washed down from the steep mountain slopes. Also included are some severely eroded areas that have a surface layer consisting mostly of material that formerly was subsoil.

The root zone is restricted at a depth of about 18 inches by the massive clay layer, and the available moisture capacity is low to moderate. The organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is fair.

Most areas have been cleared and used for crops and pasture, but many of these areas have reverted to woods. This soil is suited to hardy, drought-resistant hay and pasture plants or to woods, but it is not suited to row crops, because of the hazard of erosion. (Capability unit VIe–3; woodland suitability group 10)

Robertsville Series

The Robertsville series consists of poorly drained soils that have a fragipan. These soils are nearly level and are in depressions on broad flats. They formed in residuum or colluvium from limestone, shale, or siltstone.

In a typical profile the surface layer is light brownish-gray silt loam about 7 inches thick. The subsoil, to a depth of 15 inches, is light-gray silt loam that has mottles of yellowish brown. Below this, to a depth of 48 inches or more, the subsoil is a firm, compact, gray silty clay loam fragipan that has mottles of yellowish brown.

Typical profile of Robertsville silt loam (1½ miles southeast of Moberly):

Ap—0 to 7 inches, light brownish-gray (2.5Y 6/2) silt loam; few, fine, faint mottles of light olive brown (2.5Y 5/4); weak, fine, granular structure; very friable; many small roots; strongly acid; gradual, smooth boundary.

Bg—7 to 15 inches, light-gray (2.5Y 7/2) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium, blocky structure; friable; common small roots; common, small, black concretions; very strongly acid; gradual, smooth boundary.

Bx1t—15 to 27 inches, gray (N 6/0) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, blocky structure; firm, compact, and brittle; many silt coatings and a few clay films; few small roots between peds in upper half; few, small, black concretions; strongly acid; gradual, smooth boundary.

B2t—27 to 48 inches +, gray (N 6/0) silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/8); weak, coarse, blocky structure; very firm, compact, and brittle; common silt coatings and a few clay films; few, small, black concretions; very strongly acid.

The depth to bedrock ranges from 4 to 6 feet or more. The solum ranges from 3½ to 5 feet in thickness. The Ap horizon is dark grayish brown (10YR 4/2), grayish brown (2.5Y 5/2), or light brownish gray (2.5Y 6/2). The Bg horizon is light brownish gray (10YR 6/2), gray (10YR 5/1), or light gray (2.5Y 7/2). It ranges from silt loam to light silty clay loam. The B horizon is gray (N 6/0 or 10YR 5/1) or light brownish gray (2.5Y 6/2). In some places the profile contains some small gravel, small rock fragments, and some thin layers that have a higher sand content.

The Robertsville soils occur with the Lawrence soils. Robertsville soils are more gray below the A horizon and are more poorly drained than the Lawrence soils.

Robertsville silt loam (0 to 2 percent slopes) (Rb).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few, small, scattered areas that have black shale bedrock at a depth of 20 to 40 inches.

A seasonal high water table is at the surface during wet periods. Permeability of the fragipan is very slow, and

the suitability of tile drainage is questionable. The root zone is restricted by the fragipan at a depth of about 15 inches, and the available moisture capacity is low to moderate. Natural fertility is low, reaction is strongly acid, and crop response to lime and fertilizer is fair. Organic-matter content is low, but tillage is easy when the moisture content is right.

Many areas are cleared and are used mainly for pasture, but some areas are wooded. This soil is better suited to water-tolerant pasture plants or trees than to cultivated crops. If adequately drained, it is suited to some crops. This soil is difficult to drain because of the slowly permeable fragipan and scarcity of suitable outlets. (Capability unit IVw-1; woodland suitability group 7)

Rockcastle Series

The Rockcastle series consists of well-drained soils that have a massive clay layer at a depth of about 9 inches that restricts rooting. These soils are sloping to moderately steep and are mostly on slopes at the foot of the mountains and, to a minor extent, are on long, narrow, convex ridgetops. They formed in residuum from acid clay shale.

In a typical profile the surface layer is grayish-brown silt loam about 5 inches thick. The subsoil is mottled, olive-gray silty clay to a depth of about 9 inches. Below the subsoil is olive, olive-gray, and yellowish-red clay that has many small shale fragments. Hard shale is at a depth of about 27 inches.

The Rockcastle soils are very low in natural fertility and are very strongly acid. Permeability is slow.

Typical profile of a Rockcastle silt loam (1½ miles south of Berea, one-half mile west of Long Hollow):

Ap—0 to 5 inches, grayish-brown (2.5Y 5/2) silt loam, weak, fine and medium, granular structure: very friable; common small roots; very strongly acid; clear, smooth boundary.

B—5 to 9 inches, olive-gray (5Y 5/2) silty clay; many, fine and medium, distinct variegations of yellowish brown (10YR 5/6); moderate, medium, angular blocky structure; very firm; few small roots; very strongly acid; about 10 percent partially weathered, olive shale fragments; clear, wavy boundary.

C—9 to 27 inches, variegated olive (5Y 5/6), olive-gray (5Y 5/2), and yellowish-red (5YR 5/6) clay; massive; firm, sticky and plastic, very hard when dry; very strongly acid; about 15 to 25 percent small, soft, olive shale fragments; this percentage increases to about 50 percent below a depth of 23 inches.

R—27 inches +, olive (5Y 5/6) or olive-gray (5Y 5/2), hard shale; streaks of dark brown (10YR 4/3) and strong brown (7.5Y 5/6); very strongly acid.

The depth to bedrock ranges from 20 to 40 inches. The A horizon is grayish brown (2.5Y 5/2), dark grayish brown (2.5Y 4/2), or pale brown (10YR 6/3). The B horizon ranges from 3 to 12 inches in thickness.

The Rockcastle soils occur with Rarden, Weikert, and Colyer soils. Rockcastle soils have a thinner solum and are grayer in the B horizon than the Rarden soils. They have fewer rock fragments and are more clayey below the A horizon than the Weikert soils. Rockcastle soils are deeper to bedrock than the Colyer soils, which formed in material weathered from black shale.

Rockcastle silt loam, 6 to 12 percent slopes (RcC).—This soil is on convex, long, narrow ridgetops.

Included with this soil in mapping are some areas that have a surface layer that is a mixture of subsoil material and the original surface layer.

The available moisture capacity is low because the root zone is restricted by the massive clay layer. Consequently, this soil is droughty. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is fair to poor.

Most areas have been used for crops or pasture, but many areas have reverted to woods. The erosion hazard is very severe where cultivated crops are grown, and plant growth is only fair. This soil is better suited to drought-resistant pasture plants or to woods. (Capability unit IVe-4; woodland suitability group 4)

Rockcastle silt loam, 12 to 20 percent slopes (RcD).—This soil is at the base of some mountain slopes. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some areas that have slopes of 20 to 30 percent.

The available moisture capacity is low because the root zone is restricted by the massive clay layer below a depth of 9 inches. As a result, this soil is droughty. Organic-matter content is low, and crop response to lime and fertilizer is poor to fair.

Most areas have been used for crops or pasture, but many have reverted to woods. This soil is not suited to row crops, but it is suited to drought-resistant hay and pasture plants or to woods. (Capability unit VIe-3; woodland suitability group 4)

Rockcastle silt loam, 20 to 30 percent slopes (RcE).—This soil is at the base of some mountain slopes.

Included with this soil in mapping are some areas that have been covered by about 1 foot of colluvial material that accumulated from the steeper slopes above and consists of gravelly silt loam with about 25 percent coarse rock fragments. Also included are a few, small, scattered areas that are severely eroded and have slopes of 6 to 30 percent.

The available moisture capacity is low because the root zone is restricted by the massive clay layer below 9 inches. Consequently, this soil is droughty. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is poor.

Many areas were once cleared, but most areas are now in woods. This soil is not suited to crops but is suited to woods or limited pasture. Only drought-resistant pasture plants are suited. (Capability unit VIIe-1; woodland suitability group 4)

Rock Outcrop

Rock outcrop consists of limestone outcrops or a layer of soil material less than 6 inches thick over limestone rock. It is not an individual mapping unit but was mapped only in complexes with Cynthiana, Fairmount, and Opequon soils. Rock outcrop is intermingled with these soils in such intricate patterns that separation is not practical. It supports very little plant growth. Some clumps of grass, bushes, or stunted trees survive in cracks and crevices.

Rock outcrop-Opequon complex, 12 to 30 percent slopes (RoE).—This mapping unit is on rather wide, convex, mountain ridgetops. Rock outcrop makes up from 60 to 75 percent of the complex, and the Opequon soils are intermingled with it in such intricate patterns that separation is not practical. A typical profile of the Opequon soils is described under the Opequon series.

421-282—73——3

Included with this mapping unit are a few small areas of Cynthiana soils.

Rock outcrop supports little plant growth. Some bushes and low-grade trees grow in cracks and crevices between rocks. The Opequon soils have a low available moisture capacity and are droughty. Natural fertility is moderate, and reaction is medium acid to slightly acid. Organic-matter content is low. Permeability is moderately slow.

Most areas are in low-quality woods, and the few areas that were cleared have reverted to herbaceous plants and trees. Because the areas of these Opequon soils are small, this mapping unit is better suited to wildlife and recreational development than to other uses. On a few of the larger ridgetops, some areas could be utilized for drought-resistant pasture plants. Growing row crops is not practical. (Capability unit VIIIs–1; woodland suitability group 12)

Rock outcrop, shale (Rs).—This miscellaneous land type is on steep hillsides, in bands of varying width. It has 1 to 6 inches of weathered black shale over hard black shale, and it includes escarpments of black shale.

Most areas are almost bare, but some areas have a few scattered trees and bushes. Other areas have a few scattered clumps of fescue or wild grass such as cheat. Rock outcrop, shale, has no potential for commercial production of plants. (Capability unit VIIIs–1; woodland suitability group 13)

Shelbyville Series

The Shelbyville series consists of deep, well-drained soils that formed in residuum from limestone and siltstone or in alluvium from soils derived mostly from limestone. Shelbyville soils are nearly level to sloping and are on ridgetops and stream terraces.

In a typical profile the surface layer is dark-brown silt loam about 9 inches thick. The subsoil is mainly brown silty clay loam to a depth of about 30 inches and is strong-brown silty clay to a depth of 40 inches. The lower part of the subsoil, to a depth of about 48 inches or more, is a strong-brown clayey layer that contains small, black concretions.

The Shelbyville soils are medium acid and have moderate natural fertility. Permeability is moderate to a depth of 30 inches and is moderately slow below this depth.

Typical profile of a Shelbyville silt loam (one-half mile west of State Route 595, 1½ miles south of State Route 52, 2½ miles northeast of Paint Lick Creek):

Ap—0 to 9 inches, dark-brown (10YR 3/3) silt loam; moderate, fine and medium, granular structure; very friable; many small roots; medium acid; clear, smooth boundary.

B1—9 to 14 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, fine, blocky structure; friable; many small roots; medium acid; gradual, smooth boundary.

B2t—14 to 30 inches, brown (7.5YR 4/4) light silty clay loam; moderate, fine and medium, blocky structure; friable to firm; common small roots; common, thin clay films; few, small, black concretions; medium acid; gradual, smooth boundary.

IIB31t—30 to 40 inches, strong-brown (7.5YR 5/6) silty clay; weak, fine and medium, blocky structure; very firm, sticky and plastic; few, thin clay films; common, small, black concretions; medium acid; gradual, smooth boundary.

IIB32—40 to 48 inches +, strong-brown (7.5YR 5/6) silty clay or clay; common, medium, faint variegations of yellowish brown (10YR 5/4); weak, fine and medium, blocky structure; very firm, sticky and plastic; few, small, black concretions; medium acid.

The depth to limestone bedrock ranges from 5 to 8 feet or more. The solum ranges from 40 to 60 inches in thickness. The Ap horizon is dark brown (10YR 3/3) or very dark grayish brown (10YR 3/2). The B1 horizon is dark yellowish brown (10YR 4/4) or brown (7.5YR 4/4). The B2 horizon is brown (7.5YR 4/4) or strong brown (7.5YR 5/6). The depth to the IIB horizon ranges from 24 to 36 inches. The IIB horizon is strong brown (7.5YR 5/6) or yellowish brown (10YR 5/4). In places the IIB31 horizon contains many, small and large, black and brown concretions. On stream terraces the IIB horizon is replaced by a silty clay loam or heavy silt loam B3 horizon that is dark yellowish brown (10YR 4/4).

The Shelbyville soils occur with Caleast, Nicholson, and Mercer soils. Shelbyville soils have a less clayey B2 horizon than the Caleast soils. They are better drained and lack the fragipan of the Nicholson and Mercer soils.

Shelbyville silt loam, 0 to 2 percent slopes (ShA).—This soil is on rather wide ridgetops and on stream terraces. Included with this soil in mapping are a few areas having a dark-colored surface layer more than 10 inches thick. Also included is a small acreage of a soil on stream terraces that is silty clay loam or silt loam below a depth of about 30 inches. Some areas have small sinks or depressions.

The available moisture capacity of this Shelbyville soil is high, and the root zone is deep. Organic-matter content is medium, tillage is easy, and crop response to lime and fertilizer is good.

Practically all areas are used for crops (fig. 8) and pasture. This soil is suited to all commonly grown crops and hay and pasture plants. The erosion hazard is only slight, as the soil is nearly level. A few areas on lower lying stream terraces are subject to occasional flooding in spring, but crops are seldom damaged. (Capability unit I–3; woodland suitability group 1)

Shelbyville silt loam, 2 to 6 percent slopes (ShB).—This soil is on convex, rather wide ridgetops and on stream terraces. Some areas have small sinks and depressions. A profile of this soil is described as typical for the series.

Included with this soil in mapping is a small acreage of a soil on stream terraces that is silty clay loam or silt loam below a depth of about 30 inches.

Figure 8.—Corn on Shelbyville silt loam, 0 to 2 percent slopes.

The available moisture capacity is high, and the root zone is deep. Organic-matter content is medium, tillage is easy, and crop response to lime and fertilizer is good.

Practically all areas are used for crops and pasture. This soil is suited to all crops and all hay and pasture plants commonly grown. The erosion hazard is moderate where row crops are grown. A few areas on lower lying stream terraces are subject to occasional flooding in spring, but crops are seldom damaged. (Capability unit IIe-1; woodland suitability group 1)

Shelbyville silt loam, 6 to 12 percent slopes (ShC).—This soil is on convex, rather wide ridgetops. Some areas have small sinks and depressions.

Included with this soil in mapping is a small acreage of a soil on stream terraces that is silty clay loam or silt loam below a depth of about 30 inches and some areas that have a surface layer that is a mixture of subsoil material and the original surface layer.

The available moisture capacity is high, and the root zone is deep. Organic-matter content is medium, tillage is easy, and crop response to lime and fertilizer is good.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and to hay and pasture plants. The erosion hazard is severe where row crops are grown. (Capability unit IIIe-1; woodland suitability group 1)

Shelocta Series

The Shelocta series consists of deep, well-drained soils. These soils are strongly sloping to moderately steep and are on colluvial slopes at the base of the steeper mountainsides.

In a typical profile the surface layer is gravelly silt loam about 6 inches thick. It is dark grayish brown in the upper 2 inches and light brownish gray in the lower part. The subsoil, to a depth of about 44 inches, is light yellowish-brown gravelly silt loam that contains common gray and brown mottles below a depth of 24 inches.

Typical profile of Shelocta gravelly silt loam (west side of Scaffold Cane Road, 1 mile north of the Rockcastle County line):

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; moderate, medium, granular structure; very friable; 20 percent coarse siltstone fragments; many roots; very strongly acid; clear, smooth boundary.

A2—2 to 6 inches, light brownish-gray (2.5Y 6/2) gravelly silt loam; weak, fine, granular structure; very friable; 20 percent coarse siltstone fragments; many roots; very strongly acid; clear, smooth boundary.

B2t—6 to 24 inches, light yellowish-brown (2.5Y 6/4) gravelly silt loam; weak, medium, blocky structure; friable; 25 percent rock fragments; few, thin clay films; common roots; very strongly acid; gradual, smooth boundary.

B3—24 to 44 inches +, light yellowish-brown (2.5Y 6/4) gravelly silt loam; common, fine, faint mottles of light brownish gray and strong brown; weak, fine and medium, blocky structure; friable; 30 percent rock fragments; very strongly acid; gradual, smooth boundary.

The solum ranges from 3 to 4 feet in thickness. The depth to hard shale or clay shale ranges from 3 to 6 feet. The coarse fragments range from 10 to 35 percent throughout the solum. In places the A horizon is brown (10YR 5/3) or light brownish gray (2.5Y 6/2). The B horizon is light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6) and is gravelly silt loam or light silty clay loam.

The Shelocta soils occur with Weikert and Rockcastle soils. Shelocta soils have a thicker solum and are deeper to bedrock than the Weikert soils. They occupy positions similar to those of the Rockcastle soils, but they have a thicker, less clayey B horizon than those soils.

Shelocta gravelly silt loam, 12 to 25 percent slopes (SlD).—This is the only soil of this series mapped in the county. Included with this soil in mapping are some small areas of soils that are similar to the Rarden and Rockcastle but formed partly in a thin cap of colluvial material like the Shelocta soils. Also included are a few, small areas of soils that are silty clay loam in the surface layer and subsoil and that have rock fragments only in the surface layer in most places.

The root zone of this Shelocta soil is deep, and the available moisture capacity is moderate. Organic-matter content is low, and rock fragments make tillage difficult. This soil is very strongly acid, and permeability is moderate. Natural fertility is low, but crop response to lime and fertilizer is good.

Most areas were once cleared, but many have reverted to woods. The erosion hazard is very severe where this soil is used for row crops. This soil is better suited to drought-resistant pasture plants or to woods. (Capability unit IVe-1; woodland suitability group 1)

Shrouts Series

The Shrouts series consists of well-drained soils that have a shallow root zone. These soils are sloping to moderately steep. They are mostly on the sides of V-shaped valleys but, to a lesser extent, are on long, narrow ridgetops between valleys. They formed in residuum from calcareous clay shale.

In a typical profile the surface layer is dark grayish-brown silty clay loam about 4 inches thick. The subsoil, to a depth of about 10 inches, is dark grayish-brown silty clay that has mottles of olive and light olive gray. It is underlain, to a depth of 22 inches, by gray, plastic clay that has mottles of pale olive and yellowish brown. Below this, to a depth of 48 inches or more, is greenish-gray clay.

The Shrouts soils are neutral or mildly alkaline and have moderate natural fertility. Permeability is slow.

Typical profile of a Shrouts silty clay loam (1¼ miles northeast of Panola, one-half mile west of Drowning Creek by farm lane):

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) silty clay loam; moderate, fine and medium, granular structure; friable to firm; many small roots; neutral; clear, smooth boundary.

B2t—4 to 10 inches, dark grayish-brown (10YR 4/2) silty clay; common, fine, faint variegations of olive (5YR 5/4) and light olive gray (5Y 6/2); moderate, medium, blocky structure; firm, sticky and plastic; common small roots; few, thin clay films; mildly alkaline; clear, smooth boundary.

C1—10 to 22 inches, gray (5Y 6/1) clay; many, medium, distinct variegations of pale olive (5Y 6/4), and light olive brown (2.5Y 5/6); massive; very firm, sticky and plastic; calcareous; gradual, smooth boundary.

C2—22 to 48 inches +, greenish-gray (5GY 6/1) clay; many, medium, distinct variegations of light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6); massive; extremely firm, sticky and plastic; few, small, highly weathered, brown limestone fragments; calcareous.

The solum ranges from 8 to 16 inches in thickness. The depth to bedrock is 5 to 7 feet or more. Thin layers of brown limestone are common throughout, and some areas have common chert

fragments. The Ap horizon is dark grayish brown (10YR 4/2) or grayish brown (2.5Y 5/2) and is silty clay loam or silty clay. The B2 horizon is dark grayish brown (10YR 4/2), grayish brown (2.5Y 5/2), or olive gray (5Y 5/2) and is silty clay or clay. The C horizon is gray (5Y 6/1), greenish gray (5GY 6/1), olive gray (5Y 5/2), or light olive gray (5Y 6/2).

The Shrouts soils occur with Otway, Brassfield, Colyer, and Rockcastle soils. Shrouts soils have a more clayey C horizon than the Otway and Brassfield soils, and they have a thinner, lighter colored A horizon than the Otway soils. They are more clayey and more alkaline throughout than the Colyer soils. They are more alkaline than the Rockcastle soils, which formed in acid residuum.

Shrouts silty clay loam, 6 to 12 percent slopes (SrC).—This soil is on convex, long, narrow ridgetops.

The available moisture capacity is low, and this soil is droughty because the root zone is restricted by the massive, very slowly permeable clay layer at a depth of about 10 inches. Crop response to fertilizer is fair, and lime is not needed. Organic-matter content is low, and tillage is somewhat difficult because of the clay content of the surface layer.

Most areas have been used for crops and pasture, but some areas have remained wooded or have reverted to woods. The erosion hazard is very severe where row crops are grown, and this soil is poorly suited to cultivation. It is better suited to drought-resistant hay or pasture plants or to woods. (Capability unit IVe–4; woodland suitability group 4)

Shrouts silty clay loam, 12 to 30 percent slopes (SrE).—This soil is on the sides of V-shaped valleys. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some narrow bands of brown limestone rockland, generally right below the ridgetops.

The available moisture capacity is low, and this soil is droughty because the root zone is restricted by the massive, very slowly permeable clay layer at about 10 inches. Crop response to fertilizer is poor, and lime is not needed. Organic-matter content is low, and tillage is somewhat difficult because of the clay content of the plow layer.

Most areas have been used mostly for pasture. Some areas are wooded. This soil is not suited to row crops, because of the shallow root zone and severe erosion hazard. It is suited to drought-resistant pasture plants or to woods. (Capability unit VIe–3; woodland suitability group 4)

Shrouts clay, 6 to 30 percent slopes, severely eroded (SuE3).—This soil is mostly on the sides of V-shaped valleys and, to a lesser extent, is on long, narrow ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is mostly subsoil material that has a high clay content.

Included with this soil in mapping are some narrow bands where brown-colored limestone crops out.

The available moisture capacity is low or very low, and the root zone is restricted by the massive, slowly permeable clay layer. Consequently, this soil is very droughty. Crop response to fertilizer is poor, and lime is not needed. The very low organic-matter content, the common, shallow gullies, and the high clay content of the surface layer make tillage difficult. Stands of pasture plants are also very difficult to obtain.

Most areas were cleared and used for crops and pasture. These areas have been abandoned and are covered with redcedar. This soil is suited to drought-resistant pasture plants. It is also suited to limited grazing or to woods. (Capability unit VIIs–2; woodland suitability group 5)

Tate Series

The Tate series consists of deep, well-drained soils that formed in alluvium. These soils are gently sloping to strongly sloping and are on high, narrow ridgetops and on the upper part of side slopes between deep, V-shaped valleys. They occur in the northeastern part of the county on uplands near the Kentucky River.

In a typical profile the surface layer is brown fine sandy loam about 14 inches thick. The subsoil is strong-brown to yellowish-brown clay loam to a depth of about 36 inches. It is yellowish-brown loam to a depth of about 44 inches and is fine sandy loam below this depth.

Tate soils are very strongly acid and are low in natural fertility. Permeability is moderate to a depth of 44 inches and is moderately rapid below this depth.

Typical profile of a Tate fine sandy loam (one-half mile west of College Hill):

Ap—0 to 6 inches, brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; very strongly acid; clear, smooth boundary.

A2—6 to 14 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; very strongly acid; clear, smooth boundary.

B2t—14 to 36 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/6) clay loam; moderate, medium, blocky structure; firm; common roots; common clay films; very strongly acid; gradual, smooth boundary.

B31t—36 to 44 inches, yellowish-brown (10YR 5/4) loam; common, fine, faint variegations of strong brown (7.5YR 5/6); weak, medium, blocky structure; friable; few clay films; very strongly acid; gradual, smooth boundary.

B21—44 to 48 inches +, yellowish-brown (10YR 5/4) fine sandy loam; common, fine, faint variegations of strong brown (7.5YR 5/6); weak, medium, blocky structure; very friable; very strongly acid.

The depth to bedrock, generally black shale, ranges from 3½ to more than 6 feet. The solum ranges from 3½ to 4½ feet in thickness. In most places the Ap horizon is brown (10YR 4/3 or 5/3), dark yellowish brown (10YR 4/4), or grayish brown (10YR 5/2). It is yellowish brown in some eroded areas. The A2 horizon is absent in some places. The B2 horizon is sandy clay loam in places, and it has a few variegations of yellowish red (5YR 4/6) in some places. The B3 horizon is strong brown or yellowish brown and is light sandy clay loam to fine sandy loam.

These soils differ from the defined range for the series in that they lack a component of igneous rocks in the parent material and have more reddish colors in the B horizon. This does not alter their usefulness and behavior.

The Tate soils occur with the Monongahela soils, which are less well drained and have a fragipan.

Tate fine sandy loam, 2 to 6 percent slopes (TaB).—This soil is on long, narrow, convex ridgetops. Included with this soil in mapping are some small areas of soils that have a slightly redder subsoil.

The root zone is deep, and the available moisture capacity is high. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is good.

Practically all areas are used for crops and pasture. After adequate lime and fertilizer are added, this soil is suited to all commonly grown crops and hay and pasture plants, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–1; woodland suitability group 1)

Tate fine sandy loam, 6 to 12 percent slopes (TaC).—This soil is on convex ridgetops and in areas along drainageways dissecting the ridgetops. A profile of this soil is described as typical for the series.

Included with this soil in mapping are some eroded areas that have a surface layer that is subsoil material mixed with the original surface layer and some small areas of soils having a slightly redder subsoil.

The root zone is deep, and the available moisture capacity is high. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is good.

Practically all areas are used for crops or pasture. After adequate lime and fertilizer are added, these soils are suited to all commonly grown crops and hay and pasture plants, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe-1; woodland suitability group 1)

Tate fine sandy loam, 12 to 20 percent slopes, eroded (TaD2).—This soil is in the heads of valleys between ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is a yellowish-brown fine sandy loam that is a mixture of subsoil material and the original surface layer.

Included with this soil in mapping are some scattered, severely eroded areas with a surface layer consisting mostly of material from the subsoil. Also included are some small areas of soils in the Mountain area that are similar in most characteristics and have slopes that range from 20 to 30 percent.

The root zone is deep, and the available moisture capacity is high. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is good.

Most areas have been used for crops and pasture, but a few small areas remain wooded or have reverted to woods. This soil is suited to most crops and to most hay and pasture plants commonly grown. It is suited to occasional cultivation, but the erosion hazard is very severe where row crops are grown. Most areas are now used mainly for pasture. (Capability unit IVe-1; woodland suitability group 1)

Trappist Series

The Trappist series consists of moderately deep, well-drained soils that formed in residuum that weathered from black shale. There soils are gently sloping to strongly sloping and are on ridgetops and side slopes.

In a typical profile the surface layer is brown silt loam about 6 inches thick. The subsoil, to a depth of about 24 inches, is heavy silty clay loam that is yellowish red to a depth of about 14 inches and is brown below this depth. The subsoil is underlain by highly weathered, soft shale that extends to hard black shale at a depth of about 30 inches.

The Trappist soils are low in natural fertility and are very strongly acid or extremely acid. Permeability is moderately slow.

Typical profile of a Trappist silt loam (one-half mile north of State Route 21 on farm road, 2¼ miles west of Berea):

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many roots; very strongly acid; clear, smooth boundary.

B2t—6 to 14 inches, yellowish-red (5YR 4/8) heavy silty clay loam; moderate, fine, blocky structure; firm; common small roots; common, thin clay films; very strongly acid; gradual, smooth boundary.

B3t—14 to 24 inches, brown (7.5YR 4/4) heavy silty clay loam; weak, fine, blocky structure; few small roots; few, thin clay films; 5 to 10 percent black shale fragments; extremely acid; gradual, smooth boundary.

C—24 to 30 inches, strong-brown (7.5YR 4/4), highly weathered shale; platy; extremely acid; gradual, wavy boundary.

R—30 inches +, black, highly fissile shale that is more dense and hard with increasing depth; locally called slate.

The depth to bedrock ranges from 20 to 40 inches. The solum ranges from 20 to 36 inches in thickness. The Ap horizon normally is brown (7.5YR 4/4 or 10YR 4/3), but in some eroded areas it is dark yellowish brown. It is silty clay loam where the soil is severely eroded. The B2 horizon is strong brown (7.5YR 5/6) in some places. The B3 horizon is dark yellowish brown (10YR 4/4) in places. The B horizon is silty clay loam or silty clay.

The Trappist soils occur with the Colyer and Berea soils. Trappist soils are deeper and have a redder B horizon than the Colyer soils. They are better drained and redder through the B horizon than the Berea soils.

Trappist silt loam, 2 to 6 percent slopes (TrB).—This soil is on convex, long, narrow ridgetops. A profile of this soil is described as typical for the series.

The available moisture capacity is only moderate because the root zone is restricted by the black shale layer at a depth of 24 inches. Consequently, this soil is somewhat droughty. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is good.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and to all commonly grown hay and pasture plants, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe-2; woodland suitability group 10)

Trappist silt loam, 6 to 12 percent slopes (TrC).—This soil is on convex, long, narrow ridgetops and in areas along drainageways. Its profile differs from the one described as typical for the series in that the surface layer is dark yellowish-brown silt loam that is a mixture of subsoil material and the original surface layer. Also, bedrock is at a depth of about 24 inches.

Included with this soil are a few scattered areas that have a surface layer similar to the one described as typical.

The available moisture capacity is only moderate because the root zone is restricted by the black shale layer at a depth of about 24 inches. The organic-matter content is low, but response to lime and fertilizer is good.

Practically all areas are used for crops and pasture. This soil is suited to most of the commonly grown crops and hay and pasture plants, but it is somewhat droughty. It is suitable for occasional cultivation, but the erosion hazard is very severe where row crops are grown. (Capability unit IVe-3; woodland suitability group 10)

Trappist silt loam, 12 to 20 percent slopes (TrD).—This soil is in areas along drainageways that dissect the ridgetops. Its profile differs from the one described as typical for the series in that the surface layer is dark yellowish-brown silt loam that is a mixture of subsoil material and the original surface layer, and bedrock is at a depth of about 22 inches.

Included with this soil in mapping are a few, small, scattered areas that are not eroded and a few, scattered severely eroded areas.

The available moisture capacity is only moderate because the root zone is restricted by the black shale layer at a depth of about 22 inches. Organic-matter content is low, but tillage is easy. Crop response to lime and fertilizer is fair.

Most areas are used for hay and pasture, but a few small areas are used for row crops or are wooded. This soil is not suited to row crops, because of the hazard of erosion. It is suited to most hay and pasture plants, but it is somewhat droughty. (Capability unit VIe-1; woodland suitability group 10)

Trappist silty clay loam, 6 to 12 percent slopes, severely eroded (TsC3).—This soil is mostly in areas along drainageways that dissect the ridgetops. Its profile differs from the one described as typical for the series in that the original surface has been lost by erosion and the surface layer is silty clay loam that is all or mostly subsoil material. Also, bedrock is at a depth of about 20 inches.

Included with this soil in mapping are a few small areas of Colyer soils.

The available moisture capacity is moderate to low because the root zone is restricted by the black shale layer at a depth of about 20 inches. The very low organic-matter content, the presence of a few shallow gullies, and the silty clay loam surface layer make tillage difficult. Good stands of pasture plants are also difficult to obtain. Crop response to lime and fertilizer is fair.

Practically all areas have been cleared and used for crops and pasture. Some areas are now abandoned and are grown up in bushes and trees. This soil is not suited to row crops, but is suited to drought-resistant pasture and hay plants or to woods. (Capability unit VIe-2; woodland suitability group 3)

Weikert Series

The Weikert series consists of shallow, well-drained soils that formed in residuum that weathered from acid siltstone. These soils are steep to very steep and are on mountainsides.

In a typical profile the surface layer is dark grayish-brown channery silt loam about 3 inches thick. The subsoil is light yellowish-brown channery silt loam. It is underlain by acid gray siltstone at a depth of about 18 inches.

Typical profile of Weikert channery silt loam (Wolf Gap Mountain, 1½ miles east of Dreyfus) :

A1—0 to 3 inches, dark grayish-brown (2.5Y 4/2) channery silt loam; weak, medium, granular structure; very friable; many small roots; 25 percent coarse siltstone fragments; very strongly acid; clear, smooth boundary.

B1—3 to 5 inches, light yellowish-brown (2.5Y 6/4) channery silt loam; weak, fine, blocky structure; very friable; many small roots; 25 percent siltstone fragments; very strongly acid; clear, smooth boundary.

B2—5 to 12 inches, light yellowish-brown (10YR 6/4) channery silt loam; moderate, fine and medium, blocky structure; very friable; common small roots; 35 percent coarse fragments; very strongly acid; gradual, smooth boundary.

B3—12 to 18 inches, light yellowish-brown (10YR 6/4) channery silt loam; weak, fine, blocky structure; friable; few small roots; 50 percent coarse fragments; very strongly acid.

R—18 inches +, gray siltstone; very strongly acid.

The depth to hard rock and the thickness of the solum range from 10 to 20 inches. An O1 or O2 horizon, or both, up to 1 inch thick, overlies the A horizon in places. The A1 horizon is grayish brown (2.5Y 5/2 or 10YR 5/2) or dark grayish brown (2.5Y 4/2). A light brownish-gray (2.5Y 6/2) A2 horizon, 2 to 6 inches thick, is in some places where the B1 horizon is absent. The B2 and B3 horizons are light yellowish brown (2.5Y 6/4 or 10YR 6/4) or yellowish brown (10YR 5/6).

The Weikert soils occur with the Shelocta, Rockcastle, and Caneyville soils. The Weikert soils are shallower than the Shelocta soils. They are less clayey below the A horizon than the Rockcastle soils, and they contain coarse fragments. They are less clayey and more acid in the B horizon than the Caneyville soils.

Weikert channery silt loam, 40 to 80 percent slopes (WeG).—This is the only soil of this series mapped in the county. Included with this soil in mapping are a few small colluvial areas that are up to 30 inches deep, and a few small areas where gray acid siltstone crops out.

The available moisture capacity is low because the root zone is restricted by bedrock at a depth of about 18 inches. Natural fertility is low, and the reaction is very strongly acid. Permeability is moderately rapid.

Practically all areas are in trees, to which the soil is better suited than to other crops because of steep slopes. (Capability unit VIIe-1; woodland suitability group 11)

Whitley Series

The Whitley series consists of deep, well-drained soils. These soils are gently sloping to strongly sloping and are on colluvial slopes, stream terraces, and mountain ridgetops in the Knobs and Mountain areas of the county.

In a typical profile the surface layer is dark yellowish-brown silt loam about 9 inches thick. The subsoil is brown heavy silt loam in the upper 7 inches and is yellowish-brown silty clay loam in the lower part. Below the subsoil, at a depth of about 36 inches, is yellowish-brown silty clay loam that is mottled with light brownish gray. It extends to highly weathered, black shale at a depth of about 44 inches. Highly fissile, black shale is at a depth of 48 inches.

These soils have moderate natural fertility and are very strongly acid. Permeability is moderate.

Typical profile of a Whitley silt loam (west side of Berea, just north of the access road to Interstate Highway No. 75) :

Ap—0 to 9 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, fine, granular structure; very friable; many roots; very strongly acid; clear, smooth boundary.

B1t—9 to 16 inches, brown (7.5YR 4/4) heavy silt loam; weak, medium, blocky structure; friable; many roots; few clay films; very strongly acid; gradual, smooth boundary.

B2t—16 to 36 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, fine and medium, blocky structure; firm, slightly sticky; common roots in upper half; common clay films; few, small, black concretions; very strongly acid; gradual, smooth boundary.

C1—36 to 44 inches, yellowish-brown (10YR 5/6) silty clay loam; common, fine, distinct mottles of light brownish gray (10YR 6/2); weak, medium, blocky structure; firm, slightly sticky; very strongly acid; abrupt, smooth boundary.

IIC2—44 to 48 inches, fractured, highly weathered black shale.

R—48 inches +, black, highly fissile shale.

The solum ranges from 3 to 4 feet in thickness. The depth to bedrock ranges from 3½ to 6 feet. In places these soils contain small amounts of shale and siltstone fragments or gravel. The Ap horizon ranges from brown (10YR 5/3) to dark yellowish brown (10YR 3/4). In places the B horizon is dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/6). It is heavy silt loam or silty clay loam. In some places the C horizon is dominantly gray and contains many mottles of yellow-

ish brown and yellowish red. This horizon is silty clay loam or silty clay.

The Whitley soils occur with the Captina and Trappist soils. Whitley soils have a thicker solum, are deeper to bedrock, and have a slightly less red B horizon than the Trappist soils. They have a less yellow B horizon than the Captina soils, which have a fragipan.

Whitley silt loam, 2 to 6 percent slopes (WhB).—This soil is on colluvial slopes at the base of hillsides or on stream terraces. A profile of this soil is described as typical for the series.

The available moisture capacity is high, and the root zone is deep. Organic-matter content is medium, tillage is easy, and crop response to lime and fertilizer is good.

Practically all areas are cleared and used for crops or pasture. This soil is suited to all commonly grown crops and hay and pasture plants, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–1; woodland suitability group 1)

Whitley silt loam, 6 to 12 percent slopes (WhC).—This soil is on colluvial areas at the base of hillsides or on stream terraces.

Included with this soil in mapping are some areas that have a surface layer that is a mixture of subsoil material and the original surface layer. Also included are some areas of soils on mountain ridgetops that are similar to this soil, except that they are underlain by sandstone rock or clay shale.

The available moisture capacity is high, and the root zone is deep. Organic-matter content is medium, tillage is easy, and crop response to lime and fertilizer is good.

Practically all areas are used for crops or pasture. This soil is well suited to all crops and all hay and pasture plants commonly grown, but the erosion hazard is severe where row crops are grown. (Capability unit IIIe–1; woodland suitability group 1)

Whitley silt loam, 12 to 20 percent slopes (WhD).—This soil is in colluvial areas at the base of hillsides. Its profile differs from the one described as typical for the series in that the surface layer is yellowish-brown silt loam that is a mixture of subsoil material and the original surface layer, or the original surface layer is only about 3 inches thick.

Included with this soil in mapping are a few, small, scattered areas that are severely eroded, have a surface layer that is mostly subsoil material, and have slopes ranging from 6 to 20 percent.

The available moisture capacity is high, and the root zone is deep. Organic-matter content is low, tillage is easy, and crop response to lime and fertilizer is good.

Most areas are used for crops or pasture, although a few areas are wooded. This soil is suited to most commonly grown crops and hay and pasture plants, but it is suited to only occasional cultivation because the erosion hazard is very severe where row crops are grown. (Capability unit IVe–1; woodland suitability group 1)

Woolper Series

The Woolper series consists of deep, well-drained soils that formed in colluvium washed from soils formed in residuum from limestone or marl. Woolper soils are gently sloping to moderately steep and are in colluvial areas at the base of steeper hillsides and on colluvial benches of some mountainsides.

In a typical profile the surface layer is very dark grayish-brown silty clay loam about 8 inches thick. The subsoil, to a depth of about 14 inches, is dark-brown silty clay. Below this, to a depth of 36 inches, the subsoil is dark yellowish-brown silty clay. It is underlain by clay mottled with shades of gray and brown.

The Woolper soils have high natural fertility and are neutral in reaction. Permeability is moderately slow.

Typical profile of a Woolper silty clay loam (200 yards northeast of Union City road crossing at Otter Creek):

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium, granular structure; friable; many roots; neutral; clear, smooth boundary.

B1—8 to 14 inches, dark-brown (10YR 3/3) silty clay; moderate, fine, subangular blocky structure; firm; many roots; neutral; gradual, smooth boundary.

B2t—14 to 36 inches, dark yellowish-brown (10YR 3/4) silty clay; moderate, fine and medium, subangular blocky structure; firm, sticky and plastic; common clay films; common, small, black concretions; neutral; gradual, wavy boundary.

C—36 to 42 inches +, mottled dark-brown (10YR 3/3), light brownish-gray (2.5Y 6/2), and yellowish-brown (10YR 5/6) clay; mottles are medium and distinct; massive; very firm, sticky and plastic; common, small, black concretions and concretionary material; neutral.

The depth to bedrock ranges from 4 to 8 feet or more. The solum ranges from 30 to 40 inches in combined thickness or more. The dark-colored Ap and B1 horizons range from 12 to 24 inches in thickness. The Ap horizon is very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), or dark brown (10YR 3/3). The B2 horizon is dark yellowish brown (10YR 4/4) in some places. The C horizon, in some places, is silty clay.

The Woolper soils occur with Otway, Fairmount, and Huntington soils. Woolper soils are deeper than the Otway and Fairmount soils, which are on hillsides. They are more clayey than the Huntington soils of the flood plains.

Woolper silty clay loam, 2 to 6 percent slopes (WoB).—This soil is in concave, long, narrow colluvial areas below steeper hillsides. A profile of this soil is described as typical for the series.

Included with this soil in mapping are a few, small, scattered areas that consist of 5 to 10 percent flagstones.

The available moisture capacity is high, and the root zone is deep. Crop response to fertilizer is good, and lime is generally not needed. Organic-matter content is high, but tillage is somewhat difficult because of the clay content of the plow layer.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and hay and pasture plants, but the erosion hazard is moderate where row crops are grown. (Capability unit IIe–2; woodland suitability group 1)

Woolper silty clay loam, 6 to 12 percent slopes (WoC).—This soil is in concave, long, narrow colluvial areas below steep hillsides.

Included with this soil in mapping are a few small areas that consist of 5 to 10 percent flagstones.

The available moisture capacity is high, and the root zone is deep. Crop response to fertilizer is good, and lime is generally not needed. Organic-matter content is high, but tillage is somewhat difficult because of the clay content of the plow layer.

Practically all areas are used for crops and pasture. This soil is suited to all commonly grown crops and hay and pasture plants, but there is a severe erosion hazard where row crops are grown. (Capability unit IIIe–2; woodland suitability group 1)

Woolper very stony silty clay loam, 12 to 30 percent slopes (WpE).—This soil is on convex benches about midway up the mountainsides. Its profile differs from the one described as typical for the series in that 5 to 10 percent of this soil is stones.

Included with this soil in mapping are a few small areas of rock rubble that consists mostly of stones.

The available moisture capacity is high, and the root zone is deep. Natural fertility is moderate, reaction is neutral, and crop response to fertilizer is good. Lime is not needed. Tillage is very difficult because of the many limestone fragments on and in the surface layer.

Most areas are now wooded, but many areas were cleared and used for crops and pasture in the past. A few areas are still used for crops and pasture. This soil is not suited to cultivation, but it is suited to all commonly grown hay and pasture plants. Maintenance of pasture is difficult because the stoniness limits the use of machinery. The soil is well suited to woodland. (Capability unit VIe-1; woodland suitability group 1)

Use and Management of the Soils

This section is designed to help the landowner understand how soils behave and how they can be used. In it are discussed the use and management of soils for crops and pasture, for woodland, for wildlife, for engineering works, and for town and country planning. Specific management is not suggested in this section for each soil. Suggestions for the use of each soil are given in the section "Description of the Soils."

Use of Soils for Crops and Pasture [2]

This section is a guide to the suitability and management of the soils for crops and pasture. It has four main parts. In the first part, some general principles of soil management are discussed. In the second part, the capability classification system is explained. In the third, the capability units are described and the use suitability and management requirements for each unit are discussed. In the fourth part, estimated yields for suitable crops are given for each of the soils under high and medium levels of management.

General principles of soil management

Some principles of soil management are general enough to apply to all the soils in the county that are suitable for farm crops and pasture, though individual soils or groups of soils may require different kinds and degrees of management.

A few soils, such as soils of the Tate series and Lawrence silt loam, are naturally low in organic-matter content. Increasing the organic-matter content of these soils is important. This can be done by adding farm manure, by leaving plant residue on the surface, and by growing sod crops, cover crops, and green-manure crops.

On most wet soils in the county, such as Newark silt loam and Lawrence silt loam, growth of cultivated crops can be improved by removing excess water through tile or through ditch drainage.

The local office of the Soil Conservation Service can assist in selecting and planning a suitable combination of practices for soils.

Capability groups of soils

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None in Madison County.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class: they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in

[2] Walter J. Guernsey, conservation agronomist, Soil Conservation Service, assisted in preparing this section.

or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in Madison County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-3 or IIIe-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management of soils by capability units

The names of soil series represented are mentioned in the description of each capability unit, but this does not mean that all the soils of a given series appear in the unit. To find the names of all the soils and the capability unit in which each soil has been placed, refer to the "Guide to Mapping Units" at the back of this survey.

All of the cultivated soils in Madison County that are gently sloping or steeper are subject to erosion and loss of organic matter and plant nutrients from the plow layer. Because most runoff and erosion occur when the cultivated crop is growing or soon after the crop has been harvested, a cropping system should be used, in combination with erosion control practices, that prevents excessive runoff and soil loss. As used in this survey, cropping system refers to the sequence of crops grown in combination with cultural and management measures that include minimum tillage, mulching, use of crop residue, growing cover and green-manure crops, and use of lime and fertilizer. Erosion control practices are contour farming, terracing, contour stripcropping, and use of diversions and grassed waterways. The effectiveness of a particular combination of these measures varies among the different kinds of soils, but different combinations may be equally effective on the same soil. For example, a corn-meadow-meadow crop sequence and proper application of fertilizer, but without erosion control practices, keeps soil loss within permissible limits on Mercer silt loam having a slope of 5 percent that is 100 feet long. If a crop sequence having more years of row crops, such as corn-corn-meadow is desired, contour farming or some other erosion control practice is needed.

The capability units are described in the pages that follow. Suitable crops and management for the soils in the unit are suggested.

CAPABILITY UNIT I-1

This unit consists of deep, nearly level, well-drained soils of the Huntington and Kickapoo series. These soils are on flood plains and in depressions. They have a high available moisture capacity. They are medium to high in organic-matter content, high in natural fertility, and neutral to slightly acid. They are easily tilled, respond well to fertilizer, and ordinarily do not need lime. Occasional flooding may occur during winter or early in spring, but row crops are seldom damaged.

The soils in this unit are well suited to all row crops and to all hay and pasture plants commonly grown in the county. Tobacco and corn can be produced continuously under a high level of management. Small grain and alfalfa are sometimes damaged by floods.

Erosion is not a hazard on these soils.

CAPABILITY UNIT I-2

This unit consists of deep, nearly level, moderately well drained soils of the Lindside and Egam series. These soils are on flood plains and in depressions. They have a high available moisture capacity and natural fertility, and they are medium to high in organic matter. The Lindside soil is easily tilled, responds well to fertilizer, and does not ordinarily need lime. The Egam soil is somewhat harder to till because of the clay content. A seasonal high water table is within 2 to 3 feet of the surface during wet periods. Flooding may occur during winter or early in spring, but crops are seldom damaged.

The soils in this unit are well suited to all crops and to all hay and pasture plants commonly grown in the county. Tobacco, corn, and small grains can be grown continuously under a high level of management. Alfalfa will produce well only when grown under a high level of management.

Tile drains help to improve internal drainage of these soils.

CAPABILITY UNIT I-3

This unit consists of deep, well-drained, nearly level soils of the Elk and Shelbyville series. These soils are on uplands and stream terraces. They have a high available moisture capacity and are medium in organic-matter content and moderate in natural fertility. These soils are medium acid to strongly acid. They are easily tilled and respond well to lime and fertilizer.

The soils in this unit are well suited to all crops and to all hay and pasture plants commonly grown in the county. Tobacco, corn, and small grains can be grown continuously under a high level of management.

Erosion is not a hazard on these soils.

CAPABILITY UNIT IIe-1

This unit consists of gently sloping, deep, well-drained soils of the Elk, Hagerstown, Shelbyville, Tate, and Whitley series and the moderately deep soils of the Culleoka series. These soils are on uplands and stream terraces. They have a loamy, friable subsoil. The Tate soil is low in organic-matter content and natural fertility and is very strongly acid. The other soils are medium in organic-matter content, moderate in natural fertility, and medium acid to very strongly acid. The Culleoka soils are underlain by rock at a depth of about 3 feet. All soils of this unit have a high available moisture capacity. They are easily tilled and respond well to lime and fertilizer.

The soils of this unit are suited to all crops and to all hay and pasture plants commonly grown in the county. Some commonly grown crops are corn, tobacco, and small grains.

The erosion hazard is moderate where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IIe-2

This unit consists of gently sloping, deep, well-drained soils of the Beasley, Caleast, Lowell, Nicholson, and Woolper series and the moderately deep soils of the Trappist series. These soils are on uplands and in colluvial areas. The Woolper soil has a high organic-matter content and does not need lime. The Nicholson soil has a moderately slowly permeable fragipan at a depth of about 2½ feet that restricts root penetration. The Trappist soil is underlain by bedrock at a depth of about 2½ feet that restricts root penetration; this soil has a moderate available moisture capacity and low natural fertility. The other soils in this unit have a high available moisture capacity, generally low to medium organic-matter content, and moderate to high natural fertility. They have a sticky, clayey subsoil below a depth of 2½ feet that slightly restricts root penetration. All the soils are neutral to very strongly acid. They respond well to lime and fertilizer, and they are easy to till, except for the Woolper soil, which has a higher clay content in the surface layer.

These soils generally are well suited to most crops and to most hay and pasture plants commonly grown in the county. Commonly grown crops include corn, tobacco, and small grains.

Erosion is a moderate hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IIe-3

This unit consists of gently sloping, moderately well drained soils of the Berea, Captina, Mercer, and Monongahela series. These soils are on uplands and stream terraces. The Berea soil has a clayey layer at a depth of about 28 inches that restricts root penetration. The other soils have a fragipan at a depth of 20 to 22 inches that restricts root penetration. All soils in this unit have a moderate available moisture capacity and are medium to low in organic-matter content and in natural fertility. They are strongly acid to very strongly acid, are easily tilled, and respond well to lime and fertilizer. The slowly permeable fragipan restricts water movement, and wetness is a limitation during prolonged wet periods.

The soils of this unit are suited to most crops and to most hay and pasture plants commonly grown in the county. These crops include corn, tobacco, and small grains. If a high level of management is maintained, alfalfa grows moderately well for 3 to 4 years.

Erosion is a moderate hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IIw-1

This unit consists of nearly level, moderately well drained soils of the Berea, Captina, Mercer, and Monongahela series. These soils are on uplands and stream terraces. The root zone is restricted by a clayey layer at a depth of about 28 inches in the Berea soil and by a fragipan at a depth of 20 to 22 inches in the other soils. All the soils have a moderate wetness limitation because surface runoff is slow and there is slow permeability in a fragipan or clayey layer. A seasonal high water table is at a depth of 18 to 24 inches during wet periods. The soils of this unit have a moderate available moisture capacity. They are medium to low in organic-matter content and in natural fertility, and they are strongly to very strongly acid. These soils are easily tilled and respond well to lime and fertilizer.

The soils in this unit are suited to most crops and to most hay and pasture plants commonly grown in the county. If a high level of management is maintained, corn and small grains can be grown continuously. Tobacco may be damaged by wetness.

Plants that tolerate slight wetness are well suited to these soils.

CAPABILITY UNIT IIw-2

Only Newark silt loam is in this capability unit. It is a nearly level soil on flood plains and in depressions. A seasonal high water table for long periods limits the root zone. This soil has a high available moisture capacity, medium organic-matter content, and moderate natural fertility. Reaction is near neutral. This soil is easily tilled and responds well to fertilizer. Lime is ordinarily not needed. Flooding generally occurs during winter and early in spring, and crops may be occasionally damaged by summer floods.

If adequate drainage is provided, this soil is suited to most crops and to most hay and pasture plants commonly grown in the county. If a high level of management is maintained, tobacco and corn can be grown continuously.

Plants that tolerate slight wetness are well suited to this soil. Alfalfa and orchardgrass tend to die out in 2 or 3 years.

CAPABILITY UNIT IIs-1

Only Boonesboro silt loam is in this capability unit. It is a moderately deep, well-drained, nearly level soil on flood plains. This soil has a moderate available moisture capacity and a high organic-matter content and natural fertility. Reaction is neutral. This soil is easily tilled and responds well to fertilizer. Lime is not needed. This soil is slightly droughty during prolonged dry periods. Occasional flooding occurs during winter or early in spring, but crops are seldom damaged.

The soil in this unit is suited to all row crops and to all pasture and hay plants commonly grown in the county. If a high management level is maintained, tobacco, corn, and small grains can be grown continuously.

Erosion is not a hazard on this soil where cultivated.

CAPABILITY UNIT IIIe-1

This unit consists of sloping, deep, well-drained soils of the Elk, Hagerstown, Shelbyville, Tate, and Whitley series and the moderately deep soils of the Culleoka series. These soils are on uplands and stream terraces. They have a loamy, friable subsoil. The available moisture ca-

pacity is high. Generally, the organic-matter content is medium and natural fertility is moderate, but the Tate soil is low in organic-matter content and natural fertility. The soils are medium acid to strongly acid, except for the Tate and Whitley soils, which are very strongly acid. All the soils are easily tilled and respond well to lime and fertilizer. The Culleoka soil is underlain by rock at a depth of about 30 inches.

The soils of this unit are suited to all crops and to all hay and pasture plants commonly grown in the county. They are well suited to tobacco and corn.

Erosion is a severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IIIe-2

This unit consists of sloping, deep to moderately deep, well-drained soils of the Beasley, Caleast, Faywood, Lowell, Nicholson, and Woolper series. These soils are on uplands and in colluvial areas. They have a moderate to high available moisture capacity, low to medium organic-matter content, and moderate natural fertility. These soils are strongly to slightly acid. The root zone is slightly restricted below a depth of 2½ feet by the slowly permeable, clayey subsoil, except in the Nicholson and Faywood soils. The root zone in the Nicholson soil is restricted by a moderately slowly permeable fragipan at a depth of about 2 feet and in the Faywood soil by rock at a depth of about 2½ feet.

The soils in this unit are suited to most crops and to most hay and pasture plants commonly grown in the county. Corn, tobacco, and small grains are commonly grown.

Erosion is a severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices help to slow surface runoff and to control erosion.

CAPABILITY UNIT IIIe-3

This unit consists of sloping, moderately well drained soils of the Berea, Captina, Mercer, and Monongahela series. These soils are on uplands and stream terraces. The root zone is restricted by a slowly permeable fragipan at a depth of 17 to 20 inches, except for the Berea soil, which has a clayey layer at a depth of about 28 inches. These soils have a moderate available moisture capacity, and medium to low organic-matter content and natural fertility. The soils are strongly acid to very strongly acid. They are easily tilled, and the response to lime and fertilizer is good to fair.

The soils of the unit are suited to most crops and to most hay and pasture plants commonly grown in the county. Corn, tobacco, and small grains are commonly grown. If a high level of management is maintained, alfalfa grows moderately well for 3 to 4 years.

Erosion is a severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IIIw-1

Only Lawrence silt loam is in this capability unit. It is a nearly level, somewhat poorly drained soil on uplands and stream terraces. This soil has a slowly permeable fragipan at a depth of about 18 inches that restricts the root zone and, along with slow surface runoff, causes a seasonal high water table for long periods. The available moisture capacity is moderate, and the organic-matter content and natural fertility are low. This soil is strongly acid to very strongly acid. It is easily tilled and responds fairly well to lime and fertilizer. Tile drainage can be successfully used under most conditions in this county. After drainage, the plant response to lime and fertilizer is much improved.

This soil is poorly suited to most row crops and pasture plants commonly grown in the county unless an adequate drainage system is installed. After the soil is drained, corn can be grown continuously under a high level of management.

Erosion is not a hazard. Plants that withstand slight to moderate wetness are well suited to this soil.

CAPABILITY UNIT IIIw-2

This unit consists of nearly level, poorly drained soils of the Blago, Dunning, and Melvin series. These soils are on flood plains and in depressions. The root zone is restricted by a seasonal high water table for long periods. The available moisture capacity is high. The Dunning soil is high in organic-matter content and natural fertility and is neutral in reaction. The Blago soil is high in organic-matter content, low in natural fertility, and very strongly acid. The Melvin soil is low in organic-matter content, moderate in natural fertility, and neutral to strongly acid. The Dunning soil is somewhat difficult to till because of the higher clay content, but the other soils are easily tilled. If drained, these soils respond well to fertilizer. The Dunning soil does not need lime. The Blago soil needs heavy applications of lime, and the Melvin soil may need lime at times.

Unless adequately drained, these soils are poorly suited to most row crops and to most hay and pasture plants commonly grown in the county. Under a high level of management, corn can be grown. Tobacco is generally not grown on these soils. Flooding is a hazard.

There is no erosion hazard on these soils. Under a high level of management, they can be cultivated continuously without damage. Workability and organic-matter content of the Melvin soil can be maintained or improved by use of cover and green-manure crops and by good crop-residue management. Sod crops also improve workability and the organic-matter content.

CAPABILITY UNIT IVe-1

This unit consists of strongly sloping, well-drained soils of the Culleoka, Elk, Shelocta, Tate, and Whitley series. All of these soils are deep except for the Culleoka soil, which is moderately deep. All have a high to moderate available moisture capacity, medium to low organic-matter content, and low to moderate natural fertility. These soils are medium acid to very strongly acid. They are easily tilled except for the Shelocta soil, which is somewhat difficult to till because it contains channery rock fragments. Plant response to lime and fertilizer is good to fair. The Culleoka soil is only moderately deep because it is underlain by rock at a depth of about 2½ feet.

The soils in this unit are suited to occasional cultivation but are better suited to hay or pasture. Kentucky blue

grass, smooth bromegrass, alfalfa, Ladino clover, Kentucky 31 tall fescue, orchardgrass, red clover, sericea lespedeza, and Korean lespedeza are well suited to these soils.

Erosion is a very severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IVe–2

This unit consists of dominantly strongly sloping, deep, well-drained soils of the Beasley, Eden, and Lowell series. These soils are on uplands. They have a moderate to high available moisture capacity, low organic-matter content, and moderate natural fertility. These soils are strongly acid to neutral. The root zone is slightly restricted at a depth of more than 2 feet by a slowly permeable clayey subsoil. Except for the Eden soil, these soils are easily tilled and plant response to lime and fertilizer is fair to good. The Eden soil is almost neutral and does not need lime, and it is somewhat difficult to till because of the higher clay content of the surface layer.

The soils in this unit are fairly well suited to occasional cultivation but are better suited to hay and pasture. Tobacco and corn grow well only under a high level of management. Kentucky bluegrass, smooth bromegrass, alfalfa, Ladino clover, Kentucky 31 tall fescue, orchardgrass, red clover, sericea lespedeza, and Korean lespedeza are suited to these soils.

Erosion is a very severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IVe–3

This unit consists of sloping, moderately deep, well-drained soils of the McAfee, Otway, and Trappist series. These soils are on uplands. The root zone is restricted by limestone rock, black shale, or marl at a depth of about 30 inches, and the available moisture capacity is only moderate. The Trappist and McAfee soils are low to medium in organic-matter content, low to moderate in natural fertility, and very strongly to medium acid. They are easily tilled and respond well to lime and fertilizer. The Otway soil is high in organic-matter content and natural fertility and is alkaline. It is somewhat difficult to till because of the high clay content of the surface layer. It responds fairly well to fertilizer, but lime is not needed.

The soils in this unit are fairly well suited to occassional cultivation but are better suited to pasture or hay. Tobacco and corn are grown but are commonly affected by drought late in summer. Timothy, alfalfa, sweet clover, red clover, Kentucky 31 tall fescue, sericea lespedeza, and Korean lespedeza are suitable grasses and legumes.

Erosion is a very severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IVe–4

This unit consists of sloping, well-drained soils of the Rarden, Rockcastle, and Shrouts series. These soils are on uplands. The root zone is restricted by a tight clay layer at a depth of 10 to 20 inches, and the available moisture capacity is moderate to low. These soils are very strongly acid, except for the Shrouts soil, which is mildly alkaline. The organic-matter content is low, and natural fertility is moderate to low. Plant response to lime and fertilizer is fair, except for the Shrouts soil, which does not need lime. These soils are easily tilled, except for the Shrouts soil. This soil is somewhat difficult to till because of the higher clay content in the surface layer.

These soils are not well suited to most row crops, but they can be occasionally cultivated without damage to the soil. They are better suited to hay and pasture. Among the suitable pasture and meadow plants are orchardgrass, timothy, white dutch clover, red clover, Kentucky 31 tall fescue, sericea lespedeza, and Korean lespedeza.

Erosion is a very severe hazard where these soils are cultivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IVe–5

Only Beasley silty clay loam, 6 to 12 percent slopes, severely eroded, is in this capability unit. It is a well-drained soil and is on uplands. The root zone is restricted at a depth of about 24 inches, and the available moisture capacity is only moderate. Tillage is difficult on this soil because the organic-matter content is very low and the surface layer is mostly subsoil material that has a high clay content. This soil has a moderate natural fertility and is medium acid. It responds fairly well to lime and fertilizer.

This soil is not well suited to row crops. It is better suited to pasture and hay. Suitable grasses and legumes are timothy, Kentucky 31 tall fescue, sericea lespedeza, and Korean lespedeza.

Erosion is a very severe hazard where these soils are cultivated. Various combinations of cropping systems and conversation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IVe–6

This unit consists of severely eroded, moderately well drained soils of the Captina and Mercer series. These soils are on uplands and stream terraces. The root zone is restricted by a slowly permeable fragipan at a depth of 14 to 18 inches. The soils have a moderate to low available moisture capacity and very low organic-matter content. Tillage is somewhat difficult because the surface layer is mostly material from the subsoil. These soils are low to moderate in natural fertility and are strongly acid to very strongly acid. They respond fairly well to lime and fertilizer.

These soils are not well suited to row crops. They are better suited to pasture and hay. Suitable grasses and legumes are Kentucky 31 tall fescue, sericea lespedeza, and Korean lespedeza.

Erosion is a very severe hazard where these soils are cutivated. Various combinations of cropping systems and conservation practices can be used to slow surface runoff and to control erosion.

CAPABILITY UNIT IVw–1

Only Robertsville silt loam is in this capability unit. It is a nearly level, poorly drained soil on uplands and

stream terraces. A fragipan at a depth of about 15 inches restricts the root zone, and the available moisture capacity is moderate to low. The very slow permeability of the fragipan and slow surface runoff result in a seasonal high water table at or near the surface for long periods. This soil is low in organic-matter content and in natural fertility, and it is strongly acid. It responds fairly well to lime and fertilizer if drainage is improved. Suitability to tile drainage is questionable.

Unless adequate drainage is provided, this soil is poorly suited to most row crops and some hay and pasture plants commonly grown in the area. Tobacco and small grains are not suited to these soils. Corn can be grown continuously under a high level of management. Pasture and meadow plants suited to this soil include Kentucky 31 tall fescue, reed canarygrass, redtop, alsike clover, Ladino clover, and Kobe lespedeza.

Erosion is not a hazard where this soil is cultivated.

CAPABILITY UNIT VIe-1

This unit consists of strongly sloping or moderately steep, well-drained soils of the Culleoka, Eden, Faywood, McAfee, Otway, Trappist and Woolper series and of Alluvial land, steep, and Cynthiana-Rock outcrop complex, 12 to 30 percent slopes. These soils have a deep to shallow root zone and a low to high available moisture capacity. They range from high to low in natural fertility and organic-matter content and are neutral to very strongly acid. Most of these soils contain rock fragments that interfere with tillage and machinery operation. Their response to fertilizer is good to poor, and the acid soils respond well to lime. Alluvial land, steep, does not generally need lime and is subject to frequent flooding.

The soils in this unit are not suited to cultivated crops, because the erosion hazard is severe where these soils are cultivated. They are suited to pasture and hay crops. Kentucky bluegrass, orchardgrass, timothy, red clover, and alfalfa are fairly well suited to soils in this unit. Kentucky 31 tall fescue and sericea lespedeza are well suited (fig. 9). Rock outcrop, in the Cynthiana-Rock outcrop complex, 12 to 30 percent slopes, supports little plant growth.

The most important concern of management is providing vegetation for ground cover on these soils because of the erosion hazard. The pasture mixture selected should be

Figure 9.—Kentucky 31 tall fescue and Korean lespedeza pasture on Culleoka flaggy silt loam, 20 to 30 percent slopes.

one that gives satisfactory forage production and ground cover and that requires the least frequent renovation of the pasture. Rest periods to allow for the regrowth of the plants should be provided after each grazing period. Grazing should be managed to provide a 3-inch minimum height of vegetative cover.

CAPABILITY UNIT VIe-2

This unit consists of sloping and strongly sloping soils of the Beasley, Brassfield, Lowell, and Trappist series. All of these soils are severely eroded, except for the Brassfield soil. They have a low to high available moisture capacity and low to moderate natural fertility. These soils are medium acid to strongly acid, except for the Brassfield soil, which is neutral. They have a very low organic-matter content and, in many areas, a plow layer that consists mostly of subsoil material, both of which make tillage difficult. Plant response to fertilizer is fair to poor, and the acid soils respond fairly well to lime.

The soils in this unit are not suited to row crops, because the hazard of erosion is severe where these soils are cultivated. They are suited to pasture and hay. Orchardgrass, red clover, and Korean lespedeza are moderately well suited to these soils, but Kentucky 31 tall fescue and sericea lespedeza are better suited.

The management of vegetation for ground cover is important because of the erosion hazard. The pasture mixture selected should be one that gives satisfactory forage production and ground cover and that requires the least frequent renovation of the pasture. Rest periods to allow for the regrowth of the plants should be provided after each grazing period. Grazing should be managed to provide a 3-inch minimum height of vegetative cover.

CAPABILITY UNIT VIe-3

This unit consists of strongly sloping, well-drained soils of the Rarden and Rockcastle series and the strongly sloping to moderately steep soils of the Shrouts series. These soils are on uplands. They have a root zone that is restricted by a massive clay shale layer at a depth of 9 to 18 inches. They have a low to moderate available moisture capacity and a low organic-matter content. The Rarden and Rockcastle soils have low natural fertility and are very strongly acid. The Shrouts soil has a moderate natural fertility and is neutral in reaction. These soils are easily tilled, except for the Shrouts soil, which is somewhat difficult to till because of the high clay content of the surface layer. Plant response to lime and fertilizer is fair to poor. The Shrouts soil does not need lime.

The soils of this unit are not suited to row crops, because the hazard of erosion is severe where these soils are cultivated. They are suited to pasture and hay. Orchardgrass, timothy, red clover, sweetclover, and Korean lespedeza are fairly well suited to these soils, but stands of these plants are not long lived. Kentucky 31 tall fescue and sericea lespedeza are better suited.

The management of vegetation for ground cover is most important because of the severe erosion hazard. The pasture mixture selected should be one that gives satisfactory forage production and ground cover and that requires the least frequent renovation of the pasture. Rest periods to allow for the regrowth of the plants are needed after each grazing period. Grazing should be managed to provide a 3-inch minimum height of vegetative cover.

CAPABILITY UNIT VIIe-1

This unit consists of dominantly steep, well-drained soils of the Brassfield, Culleoka, Eden, Otway, and Weikert series and moderately steep soils of the Rockcastle series and of Fairmount-Rock outcrop complex, 30 to 60 percent slopes. These soils have a root zone that is restricted at a depth of from 12 to 24 inches, and they have a low to moderate available moisture capacity. They range from low to high in natural fertility and are very strongly acid to alkaline. Steep slopes and rock fragments on the surface of most of these soils make machinery operation very difficult. The Rockcastle soil is very low in natural fertility. The use of machinery is not hampered, but its use for cultivation is limited by the poor response of this soil to lime and fertilizer. Most areas of the soils in this unit are in woods.

The soils in this unit are not suited to cultivation, because of steep slopes and the risk of erosion. They are suited to limited pasture but are better suited to woodland or wildlife habitat. Rock outcrop, in the Fairmount-Rock outcrop complex, 30 to 60 percent slopes, supports little plant growth. The selection of pasture plants is very limited. Kentucky 31 tall fescue (fig. 10) and sericea lespedeza produce a small to moderate growth. Stands of other pasture plants are not vigorous and are very poor in growth and short lived. A high level of management generally is not justified on these soils.

Because of the severe risk of erosion, the management of vegetation for ground protection is very important. The pasture mixture selected should be one that gives satisfactory forage production and ground cover and that requires the least frequent renovation. Because it is extremely diffi-

Figure 10.—**Kentucky 31 tall fescue pasture on Brassfield silt loam, 30 to 50 percent slopes.**

cult to operate farm machinery, mowing for weed control and spreading fertilizer and lime are also very difficult, costly, and in some places, hazardous. Rest periods to allow for the regrowth of plants should be provided after each grazing period. Grazing should be managed to provide a 3-inch minimum height of vegetative cover.

CAPABILITY UNIT VIIe-2

This unit consists only of Gullied land. These areas are characterized by deep gullies that have exposed the underlying calcareous material. Most areas that are protected from livestock are in brush and are mainly stabilized. Other areas are mostly bare.

These areas can seldom be reclaimed economically for pasture use. They are better suited to woodland or wildlife.

CAPABILITY UNIT VIIs-1

This unit consists of steep, stony soils of the Caneyville series and strongly sloping to steep, shaly soils of the Colyer series. These soils have a root zone that is restricted by rock at a depth of 10 to 30 inches, and they have a low to moderate available moisture capacity. These soils, except for the strongly sloping to moderately steep Colyer soils, are either too steep or too rocky for the operation of farm machinery, and practically all areas are in woodland. They have low to moderate natural fertility and are very strongly acid to moderately acid. The strongly sloping to moderately steep Colyer soil is very low in natural fertility, is very strongly acid, and responds poorly to fertilizer and lime. Many of these areas are used for pasture, but maintaining good stands of pasture plants is difficult because of droughtiness.

These soils are best suited to Kentucky 31 tall fescue and sericea lespedeza; however, the amount of forage produced generally is low. Other plants are extremely short lived.

Maintaining ground cover to prevent erosion is very important. Pasture should not be grazed continuously. Rest periods to allow for regrowth of the plants are needed after each grazing period. Grazing should be managed to provide a 3-inch minimum height of vegetative cover.

CAPABILITY UNIT VIIs-2

This unit consists of severely eroded, droughty soils of the Colyer and Shrouts series. These soils are sloping to steep. They have a root zone that is restricted at a depth of 8 to 12 inches and rave a low to very low available moisture capacity. The Shrouts soil is moderate in natural fertility, and it is alkaline. The Colyer soil has very low natural fertility and is very strongly acid. It responds poorly to lime and fertilizer. Lime is not needed on the Shrouts soil. All the soils have a very low organic-matter content and common, shallow gullies that make tillage somewhat difficult. Pastures are difficult to maintain because of droughtiness, and many areas are in brush or are reverting to woods.

These soils are suited to woodland and wildlife.

CAPABILITY UNIT VIIIs-1

This unit consists of Rock outcrop, shale, and Rock outcrop-Opequon complex, 12 to 30 percent slopes. There also are areas of limestone rock outcrops. Opequon soils are shallow over limestone rock.

Plant growth is limited to some wild grasses in the spring when moisture is abundant, and a few clumps of grasses in cracks and crevices where soil material is slightly deeper. In wooded areas, some bushes and low-quality trees survive in cracks and crevices. Opequon soils, in the mapping unit Rock outcrop-Opequon complex, 12 to 30 percent slopes, are suited to pasture plants or trees.

The most suitable use is wildlife.

Estimated yields

The estimated average acre yields of the crops most commonly grown in Madison County, under two levels of manegement, are given in table 2. Yields for a medium level of management are shown in columns A, and those for a high level of management are shown in columns B.

The yields given are the average that can be expected over several years. Yields for one year may be affected adversely by extremes of weather, insects, disease, or some other disaster, or they may be extremely high because of a combination of favorable factors.

The differences between yields in columns A and those in columns B represent the increases in yields that may be expected by improving management. No yields under a medium level of management are given for tobacco, because a high level of management is nearly always used. Gullied land and Rock outcrop, shale, are not listed, because they are not suitable for crops and pasture.

A medium level of management is the management, including applications of fertilizer, that is generally considered the minimum that will keep the soil from deteriorating and produce sufficient crops for some profit.

A high level of management includes: (1) using adapted recommended varieties; (2) using proper seeding rates, inoculating legumes, planting at the right time and in the right way, and using efficient harvesting methods; (3) controlling weeds, insects, and plant disease; (4) applying fertilizer at a rate equal to or above the current recommendations of the University of Kentucky Agricultural Experiment Station or equal to or above the need shown by properly interpreted soils tests; (5) using adequate applications of lime; (6) draining naturally wet soils that are feasible to drain; (7) using cropping systems that control erosion and maintain soil structure, tilth, and organic-matter content; (8) applying erosion control measures such as contour tillage, terracing, contour stripcropping, and sodded waterways; (9) using cover crops or crop residues, or both, to increase supplies of organic matter and control erosion; (10) using all the applicable practices of pasture management; and (11) using management practices such as minimum tillage and interseeding winter crops in row crops.

A high level of management is not considered the highest level than can be attained, but it is one that many farmers find practical to reach, if they apply the proper practices listed for a high level of management may cause the production that is economically feasible.

The failure to adequately apply one or more of the practices listed for a high level of management may cause the production level to drop and not return a profit and may result in some permanent damage to the soil. Inadequate drainage or only partial application of practices for controlling runoff and erosion are examples of deficiencies that relate to a medium level of management.

TABLE 2.—*Estimated average acre yields of principal crops*

[Yields in columns A are those expected under a medium level of management; those in columns B are yields to be expected under a high level of management. Dashes indicate that the soil is considered unsuitable for the crop, or that the crop is not commonly grown on the soil. Gullied land and Rock outcrop, shale, are not used for crops and are not listed]

Soil	Corn		Tobacco	Wheat		Alfalfa and grass		Red clover		Lespedeza		Pasture	
	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lbs.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Alluvial land, steep	----	----	----	----	----	----	----	----	----	----	----	140	175
Beasley silt loam, 2 to 6 percent slopes	60	90	2, 600	25	40	2. 5	4. 0	1. 7	2. 6	1. 3	1. 8	135	200
Beasley silt loam, 6 to 12 percent slopes	40	75	2, 250	20	35	2. 0	3. 5	1. 5	2. 3	1. 2	1. 6	135	200
Beasley silt loam, 12 to 20 percent slopes	35	60	1, 950	15	25	1. 5	2. 8	1. 2	1. 9	----	----	100	160
Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	30	50	1, 650	10	18	. 8	1. 7	. 5	1. 1	. 5	1. 0	55	110
Beasley silty clay loam, 12 to 20 percent slopes, severely eroded	----	----	----	----	----	----	1. 5	----	. 9	----	----	60	100
Berea silt loam, 0 to 2 percent slopes	50	85	2, 200	15	25	1. 4	2. 3	1. 6	2. 3	1. 2	1. 6	135	200
Berea silt loam, 2 to 6 percent slopes	50	85	2, 500	20	30	1. 8	2. 8	2. 0	2. 6	1. 3	1. 7	140	210
Berea silt loam, 6 to 12 percent slopes	40	70	2, 200	18	25	1. 4	2. 3	1. 6	2. 3	1. 2	1. 6	135	200
Blago silt loam	50	110	2, 200	----	20	----	2. 5	----	2. 5	----	1. 7	155	220
Boonesboro silt loam	75	110	2, 700	30	40	3. 5	4. 5	2. 4	2. 9	1. 4	1. 8	165	230
Brassfield silt loam, 6 to 12 percent slopes	----	----	----	----	----	----	1. 5	----	1. 0	----	9	60	95
Brassfield silt loam, 12 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	40	80
Brassfield silt loam, 30 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	60
Caleast silt loam, 2 to 6 percent slopes	75	115	3, 000	28	43	3. 5	5. 0	2. 0	3. 0	1. 5	2. 0	190	240
Caleast silt loam, 6 to 12 percent slopes	70	100	2, 700	25	40	3. 2	4. 8	1. 8	2. 8	1. 3	1. 8	170	230
Caneyville very stony silt loam, 35 to 60 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----
Captina silt loam, 0 to 2 percent slopes	60	90	2, 200	15	25	1. 4	2. 3	1. 5	2. 3	1. 2	1. 6	135	195
Captina silt loam, 2 to 6 percent slopes	60	90	2, 600	20	30	1. 8	2. 8	1. 7	2. 6	1. 3	1. 7	135	195
Captina silt loam, 6 to 12 percent slopes	45	75	2, 200	18	25	1. 4	2. 3	1. 6	2. 3	1. 2	1. 6	120	175
Captina silt loam, 6 to 12 percent slopes, severely eroded	30	45	1, 650	10	18	----	----	----	1. 5	----	1. 0	70	100
Colyer shaly silt loam, 12 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	50	85
Colyer shaly silty clay loam, 12 to 50 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	30	45
Culleoka silt loam, 2 to 6 percent slopes	70	100	2, 800	30	45	2. 8	4. 5	2. 0	2. 7	1. 5	2. 0	140	200
Culleoka silt loam, 6 to 12 percent slopes	55	80	2, 600	25	38	2. 4	4. 0	1. 7	2. 5	1. 2	1. 7	135	200
Culleoka silt loam, 12 to 20 percent slopes	35	60	1, 900	15	25	1. 8	3. 0	1. 2	1. 7	----	----	100	155
Culleoka flaggy silt loam, 20 to 30 percent slopes	----	----	----	----	----	----	2. 7	----	1. 6	----	----	80	130
Culleoka flaggy silt loam, 30 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	55	100
Cynthiana-Rock outcrop complex, 12 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	55	100
Dunning silty clay loam	60	110	2, 300	----	20	----	3. 0	----	2. 5	----	1. 8	150	220
Eden silty clay loam, 6 to 20 percent slopes, eroded	45	75	2, 250	15	25	2. 0	3. 5	1. 3	2. 5	----	----	130	200

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of principal crops*—Continued

Soil	Corn		Tobacco	Wheat		Alfalfa and grass		Red clover		Lespedeza		Pasture	
	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lbs.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Eden flaggy clay, 20 to 30 percent slopes, eroded	------	------	------	------	------	1.0	2.2	.7	1.2	------	------	85	130
Eden flaggy clay, 30 to 50 percent slopes, eroded	------	------	------	------	------	------	------	------	------	------	------	55	90
Egam silty clay loam	80	120	3,000	20	35	2.7	4.5	2.0	2.8	1.5	2.0	180	260
Elk silt loam, 0 to 2 percent slopes	70	120	3,100	30	45	3.0	5.0	2.0	3.0	1.3	2.0	180	260
Elk silt loam, 2 to 6 percent slopes	70	115	3,000	28	45	3.0	5.0	2.0	3.0	1.3	2.0	180	260
Elk silt loam, 6 to 12 percent slopes	50	90	2,600	20	38	2.6	4.5	1.7	2.7	1.1	1.8	150	220
Elk silt loam, 12 to 20 percent slopes	40	70	2,000	18	30	2.0	3.5	1.3	2.0	------	------	120	180
Fairmount-Rock outcrop complex, 30 to 60 percent slopes	------	------	------	------	------	------	------	------	------	------	------	50	85
Faywood silt loam, 6 to 12 percent slopes	40	70	2,100	20	30	2.0	3.5	1.3	2.0	1.0	1.5	120	180
Faywood silt loam, 12 to 30 percent slopes	------	------	------	------	------	1.0	2.0	.7	1.5	------	------	80	150
Hagerstown silt loam, 2 to 6 percent slopes	70	120	3,000	30	45	3.0	5.0	2.0	3.0	1.5	2.0	180	260
Hagerstown silt loam, 6 to 12 percent slopes	50	95	2,600	25	40	2.5	4.5	1.7	2.7	1.2	1.8	170	240
Huntington silt loam	85	125	3,100	30	40	4.2	5.5	2.7	3.3	1.6	2.0	185	260
Kickapoo fine sandy loam	75	110	2,600	------	------	3.5	4.5	2.0	2.5	1.5	2.0	180	240
Lawrence silt loam	40	80	2,000	------	15	------	2.5	1.0	2.5	1.0	1.6	100	200
Lindside silt loam	80	120	3,000	20	35	2.5	4.0	2.0	3.3	1.5	2.0	180	250
Lowell silt loam, 2 to 6 percent slopes	70	110	2,800	25	40	3.0	4.7	1.8	2.8	1.3	2.0	180	250
Lowell silt loam, 6 to 12 percent slopes	50	90	2,300	18	30	2.3	4.2	1.5	2.5	1.2	1.8	165	220
Lowell silt loam, 12 to 20 percent slopes	35	65	1,950	12	20	------	3.5	1.2	1.9	------	------	125	185
Lowell silty clay loam, 12 to 30 percent slopes, severely eroded	------	------	------	------	------	------	1.8	------	1.3	------	------	60	100
McAfee silt loam, 6 to 12 percent slopes	40	75	2,400	20	30	2.0	3.5	1.5	2.3	1.0	1.7	125	190
McAfee silt loam, 12 to 20 percent slopes	------	------	------	------	------	1.5	3.0	1.3	2.0	------	------	90	165
Melvin silt loam	30	85	------	------	------	------	------	------	2.2	------	1.7	85	200
Mercer silt loam, 0 to 2 percent slopes	60	95	2,300	15	28	1.5	3.0	1.5	2.5	1.3	1.7	140	210
Mercer silt loam, 2 to 6 percent slopes	60	95	2,700	20	33	2.0	3.5	1.8	2.8	1.4	1.8	140	210
Mercer silt loam, 6 to 12 percent slopes	40	70	2,200	18	25	1.4	2.3	1.6	2.3	1.2	1.6	135	200
Mercer silty clay loam, 6 to 12 percent slopes, severely eroded	25	40	1,650	10	15	------	------	------	1.5	------	1.0	60	100
Monongahela fine sandy loam, 0 to 2 percent slopes	50	90	2,200	15	25	------	2.5	1.0	2.3	1.0	1.6	135	200
Monongahela fine sandy loam, 2 to 6 percent slopes	50	90	2,600	20	30	1.0	2.8	1.2	2.6	1.3	1.7	140	200
Monongahela fine sandy loam, 6 to 12 percent slopes	40	75	2,200	15	25	------	2.3	1.5	2.3	1.2	1.6	130	190
Newark silt loam	70	115	2,600	15	30	1.5	4.5	1.8	3.0	1.5	2.0	180	225
Nicholson silt loam, 2 to 6 percent slopes	65	115	3,000	25	40	3.0	4.5	1.8	3.0	1.3	2.0	180	250
Nicholson silt loam, 6 to 12 percent slopes	55	95	2,600	22	38	2.5	4.2	1.6	2.8	1.0	1.8	150	220
Otway silty clay, 6 to 12 percent slopes	35	50	1,800	10	20	2.0	3.0	1.5	2.0	1.0	1.5	100	150
Otway silty clay, 12 to 30 percent slopes	------	------	------	------	------	1.5	2.0	------	1.5	------	------	80	125

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of principal crops*—Continued

Soil	Corn		Tobacco	Wheat		Alfalfa and grass		Red clover		Lespedeza		Pasture	
	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lbs.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Otway silty clay, 30 to 50 percent slopes												50	90
Rarden silt loam, 6 to 12 percent slopes	25	60	1, 700	10	25				1. 5	. 5	1. 2	80	140
Rarden silt loam, 12 to 20 percent slopes, eroded												70	120
Robertsville silt loam	25	55							1. 5		1. 0	80	180
Rockcastle silt loam, 6 to 12 percent slopes	25	40									1. 0	60	100
Rockcastle silt loam, 12 to 20 percent slopes												50	90
Rockcastle silt loam, 20 to 30 percent slopes												40	80
Rock outcrop-Opequon complex, 12 to 30 percent slopes													
Shelbyville silt loam, 0 to 2 percent slopes	80	125	3, 100	30	45	3. 5	5. 3	2. 0	3. 0	1. 5	2. 0	190	260
Shelbyville silt loam, 2 to 6 percent slopes	75	120	3, 100	30	45	3. 4	5. 3	2. 0	3. 0	1. 5	2. 0	190	250
Shelbyville silt loam, 6 to 12 percent slopes	60	95	2, 800	25	40	3. 2	4. 8	1. 8	2. 8	1. 3	1. 8	170	240
Shelocta gravelly silt loam, 12 to 25 percent slopes	35	60	1, 800	15	25		2. 5		1. 5			80	145
Shrouts silty clay loam, 6 to 12 percent slopes	25	40	1, 400	12	20			. 7	1. 3	. 5	1. 2	75	120
Shrouts silty clay loam, 12 to 30 percent slopes												60	100
Shrouts clay, 6 to 30 percent slopes, severely eroded												30	60
Tate fine sandy loam, 2 to 6 percent slopes	65	95	2, 700	20	40		3. 8	1. 0	2. 5	1. 0	2. 0	140	225
Tate fine sandy loam, 6 to 12 percent slopes	55	85	2, 300	20	35		3. 5	1. 0	2. 3	. 8	1. 8	125	210
Tate fine sandy loam, 12 to 20 percent slopes, eroded	35	60	2, 000	15	25		2. 8		1. 8			100	180
Trappist silt loam, 2 to 6 percent slopes	40	85	2, 500	20	35		3. 7	1. 0	2. 3	1. 0	1. 9	130	200
Trappist silt loam, 6 to 12 percent slopes	35	70	2, 250	18	30		3. 5	1. 0	2. 0	. 9	1. 5	125	185
Trappist silt loam, 12 to 20 percent slopes							2. 5		1. 5			100	145
Trappist silty clay loam, 6 to 12 percent slopes, severely eroded							1. 5		1. 0			60	100
Weikert channery silt loam, 40 to 80 percent slopes													
Whitley silt loam, 2 to 6 percent slopes	65	100	2, 800	20	35	2. 0	4. 8	1. 5	3. 0	1. 0	2. 0	150	250
Whitley silt loam, 6 to 12 percent slopes	55	90	2, 600	20	35	1. 8	4. 5	1. 5	2. 8	1. 0	1. 8	135	230
Whitley silt loam, 12 to 20 percent slopes	35	70	2, 150	10	25		3. 8		2. 4			110	200
Woolper silty clay loam, 2 to 6 percent slopes	80	115	2, 850	20	35	3. 0	5. 0	2. 0	3. 0	1. 5	2. 0	180	250
Woolper silty clay loam, 6 to 12 percent slopes	70	100	2, 600	20	35	3. 0	4. 7	1. 8	2. 8	1. 3	1. 8	170	235
Woolper very stony silty clay loam, 12 to 30 percent slopes												100	180

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the pasture. An acre of pasture that provides 80 days of grazing for three cows has a carrying capacity of 240 cow-acre-days.

Use of Soils for Woodland [3]

In the early days Madison County was nearly all covered with hardwood forest. On the uplands, where the soils are deep over limestone, were white oak, northern red oak, yellow-poplar, black walnut, white ash, sugar maple, black cherry, and other desirable trees. The shallow soils supported mainly black oak, scarlet oak, chestnut oak, eastern redcedar, and Virginia pine. The lowlands along stream valleys supported sweetgum, pin oak, sycamore, willow, and red maple.

Except for the rough areas found chiefly in the southern edge of the county, practically all of the soils that are deep over limestone have been cleared of trees and converted to cropland. The trees on these soils are widely scattered and are used primarily for shade. A few thousand acres of the shallow, rocky soils have reverted to low-quality hardwoods, Virginia pine, and eastern redcedar. Nearly all of the lowlands have been cleared and drained, and only a small acreage is wooded. Approximately 20 percent of Madison County is currently in forest.

Most of the woodland in the county receives little management. Berea College owns a large area of woodland and employes a full-time forester to manage the forests and operate the sawmill. The college sells excess lumber. Furniture and other finished wood products are manufactured from locally produced timber by Berea students.

Good markets exist for good-quality oak, yellow-poplar, and other desirable hardwoods. Local markets are needed for eastern redcedar and hardwoods that are not suitable for use as veneer stock or lumber, but that can be used for small dimension stock, pulpwood, or charcoal.

Many soils in Madison County have the potential for producing larger wood crops of better quality. To more fully realize these potentials, better management of woodland is generally necessary. Such management should relate to the characteristics of the soils.

Woodland suitability grouping of soils

The soils in Madison County have been placed in 13 woodland suitability groups on the basis of their influence on the growth and management of trees. Each group consists of soils that are suitable for similar kinds of trees, that need similar management, and that have about the same productivity.

The factors considered in placing each soil in a woodland group are (1) potential productivity for several kinds of trees, (2) species to favor in managing existing woodland, (3) species preferred for planting, and (4) critical soil-related hazards and limitations to be considered in woodland management, such as erosion hazard, use of equipment, plant competition, and seedling mortality.

On some soils the site index, productivity, and limitation vary from one area to another because of aspect, or the compass direction in which a slope faces. Aspect is listed as north or south. Slopes that face north or east of a line drawn from true northwest to true southeast have a north aspect; those that face south or west of this line have a south aspect.

The potential productivity is expressed as site index, or the expected height in feet that a tree species or forest type will attain on a specified kind of soil or group of soils at a specified age. This age is 50 years for most species. The site index ratings shown for each woodland suitability group are expressed as a range in height, generally 10 feet or less. For example, the site index for oaks on soils in woodland suitability group 1 is 70 to 80 feet.

In gathering data for determining the site indexes for tree species, many trees in this county and in adjacent areas were measured and the soils at each site were described. As nearly as possible, the studies were confined to well-stocked, naturally occurring, even-aged, essentially unmanaged stands that had not been damaged by fire, insects, disease, or grazing.

The average height and age measurements gathered for different tree species were converted to site index by using site index curves in published research (*3, 4, 5, 7, 9, 12*). The site index curves used in determining the ratings for eastern redcedar are unpublished curves developed from observations on 271 plots in the Tennessee Valley.

Site index can be converted to a volumetric prediction of growth and yield that can be shown in wood measurements such as board feet per acre.

Predictions of average yearly growth per acre in board feet (International 1/4 inch scale) are based on published data (*8, 9, 11, 12, 13*), and on tree growth data from soil-site evaluations by the Soil Conservation Service. Yearly growth estimates are to age 60 for yellow-poplar and the oaks and to age 50 for the other species.

Erosion hazard is rated according to the risk of soil erosion that may occur following cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and landing areas. It is assumed that the woodland is well managed and is protected from fire and grazing. Soil characteristics or properties considered in rating erosion hazard include slope, rate of infiltration, permeability of the subsoil, water storage capacity, and resistance to detachment of soil particles by forces of rainfall and runoff. The following relative ratings are used to indicate the intensity of erosion control measures needed to reduce erosion. *Slight* indicates that no special measures are needed. *Moderate* indicates that some attention needs to be given to the prevention of soil erosion. *Severe* indicates that intensive erosion control measures are needed. Woodland can be protected from erosion by varying the rotation age and adjusting the cutting cycles; by taking care in constructing and maintaining roads, trails, fire lanes, and landings; and by using special techniques in management.

Equipment limitations are influenced by topographic and soil characteristics, such as slope, drainage, soil texture, stoniness, and rockiness. The characteristic may restrict the use of conventional wheel or track-type equipment for harvesting and planting trees, for constructing roads, for controlling fire, and for controlling unwanted vegetation. Topographic conditions or differences in soils may necessitate the use of different kinds of equipment and methods of operation, or may require a specific period when equipment is used. Generally, the limitation is *slight* if farm machinery can be operated efficiently without construction and maintenance of permanent roads and truck trails. The rating is *moderate* if the use of ordinary farm machinery is limited, if track-type equipment is necessary for efficient harvesting, or if soil wetness prevents the use of logging vehicles for 2 to 6 months in a year. The rating is *severe* if track-type equipment is severely limited for harvesting and power winches and other special equipment

[3] By WILLIAM M. MORRILL, woodland conservationist, and E. V. HUFFMAN, assistant State soil scientist, Soil Conservation Service.

are needed, or if wetness prevents the use of vehicles for 6 months or more.

Unwanted trees, vines, shrubs, and other plants invade a site when openings are made in the canopy. This competition hinders the establishment and normal development of desirable seedlings, whether they occur naturally or are planted. Plant competition is *slight* if unwanted plants do not prevent adequate natural regeneration, interfere with early growth, or restrict the normal development of planted stock. Competition is *moderate* if unwanted plants delay establishment and hinder the growth of either planted stock or naturally regenerated seedlings, or if the unwanted plants retard the development of a fully stocked stand. Competition is *severe* if unwanted plants prevent adequate restocking, either by natural regeneration or by planting, without intensive preparation of the site or special maintenance.

Some loss of seedlings is expected if soil characteristics or topographic features are unfavorable, even though plant competition is not a factor. Seedling mortality is *slight* if the expected loss is not more than 25 percent of the number needed to provide optimum stocking. Mortality is *moderate* if the expected loss is between 25 and 50 percent. It is *severe* if the expected loss is more than 50 percent. If the rating is *moderate* or *severe*, replanting is likely to be needed to insure a fully stocked stand and special preparation of the seedbed and special planting techniques are often necessary.

The discussion of the woodland suitability groups that follows contains a brief description of the soils in each group and evaluations for tree production based on the foregoing factors. Detailed descriptions of the soils are in the section "Descriptions of the Soils."

WOODLAND SUITABILITY GROUP 1

This group consists of deep, well-drained, nearly level to steep soils on uplands and stream terraces. These soils are in the Caleast, Culleoka, Elk, Hagerstown, Lowell, Nicholson, Shelbyville, Shelocta, Tate, Whitley, and Woolper series.

Site indexes for the rated species are 70 to 80 for oaks, 95 to 105 for yellow-poplar, 70 to 80 for shortleaf pine, and 70 to 80 for Virginia pine. The average yearly growth per acre is approximately 240 board feet for oaks, 550 board feet for yellow-poplar, 670 board feet for shortleaf pine, and 540 board feet for Virginia pine. Intensive management is justified on the soils of this group.

Species to favor in managing existing stands are yellow-poplar, black walnut, white pine, white ash, sugar maple, black cherry, basswood, white oak, northern red oak and black oak.

Species to favor for planting are black locust, yellow-poplar, black walnut, northern red oak, white oak, white pine, shortleaf pine, and white ash.

The erosion hazard is slight on slopes of 12 percent and less, moderate on slopes that range from over 12 percent to 20 percent, and severe on steeper slopes. Location, construction, and maintenance of roads and skid trails on slopes of more than 12 percent need special attention.

Equipment limitation is moderate on slopes that range from 12 to 30 percent and severe on slopes of more than 30 percent. Harvesting the timber efficiently may require track-type equipment or winches.

Plant competition is moderate to severe. Shade-tolerant trees of low quality that become established in the understory of saw-log stands may prevent the satisfactory establishment and growth of desirable trees after logs have been harvested. To insure the dominance of desirable trees generally requires one or more weedings. Tree planting or interplanting is generally not feasible, because of the weeding requirements.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 2

This group consists of dominantly moderately deep, well-drained, gently sloping to steep soils on uplands. These soils are in the Beasley, Caneyville, Faywood, and McAfee series.

Site indexes for the rated species are 60 to 70 for oaks and 35 to 45 for eastern redcedar. The average yearly growth per acre is approximately 160 board feet for oaks. A medium intensity of management is justified on soils of this group.

Species to favor in managing existing stands are black oak, southern red oak, white oak, Virginia pine, white ash, and eastern redcedar.

The erosion hazard is moderate on slopes that range from 6 to 12 percent and severe on slopes of more than 12 percent. Location, construction, and maintenance of roads and skid trails, especially where the slope is more than 12 percent, need special attention.

Equipment limitation is moderate on slopes that range from 12 and 20 percent, and harvesting wood crops efficiently may require track-type equipment. The limitation is severe on slopes of more than 30 percent, and the harvest of timber in some areas may require winches.

Plant competition is moderate. Shade-tolerant trees in the understory of saw-log stands may compete with and prevent the satisfactory reestablishment of desirable trees. To insure the dominance of desirable trees may require one or more weedings. Weeding requirements make the feasibility of interplanting or conversion planting questionable.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 3

This group consists of moderately deep to deep, severely eroded, well-drained, sloping to moderately steep soils on uplands and stream terraces. These soils are in the Beasley, Lowell, and Trappist series.

Site indexes for the rated species are 40 to 50 for oaks and 30 to 40 for eastern redcedar. The average yearly growth per acre is approximately 50 board feet for oaks. Only a limited level of management is justified on the soils of this group.

Species to favor in managing existing stands are white oak, black oak, post oak, southern red oak, Virginia pine, white ash, and eastern redcedar.

Species to favor for planting are Virginia pine, shortleaf pine, white pine, loblolly pine, and eastern redcedar.

The erosion hazard is slight to moderate. Location, construction, and maintenance of roads, and ski trails on slopes of more than 12 percent need some attention.

Equipment limitation is moderate on slopes of 20 percent or less and is severe on slopes of more than 20 percent. To harvest wood crops efficiently on the steeper areas may require track-type equipment or power winches.

Plant competition is slight.

Seedling mortality is moderate to severe because short, droughty periods of one or more weeks occur in the early part of some growing seasons. These dry periods may cause moderate to severe losses to newly regenerated or planted trees.

WOODLAND SUITABILITY GROUP 4

This group consists of deep to moderately deep, well-drained and somewhat excessively drained, sloping to steep soils on uplands. These soils are in the Eden, Otway, Rockcastle, and Shrouts series. They have a silt loam to clay surface layer and a clay subsoil.

Site indexes for the rated species is 55 to 65 for oaks, 55 to 65 for Virginia pine, and 35 to 45 for eastern redcedar. The average yearly growth per acre is approximately 155 board feet for oaks and 410 board feet for Virginia pine. A medium intensity level of management is justified on the soils of this group.

Species to favor in managing existing stands are white oak, post oak, black oak, scarlet oak, Virginia pine, and eastern redcedar.

Species to favor for planting are eastern redcedar, Virginia pine, Scotch pine, and red oak.

The erosion hazard is moderate on slopes that range from 6 to 20 percent and is severe on slopes of more than 20 percent.

Equipment limitation is moderate on slopes of up to 20 percent and is severe on slopes of more than 20 percent because of the clayey texture of soils in this group.

Plant competition is slight.

Seedling mortality is moderate to severe because short, droughty periods of one or more weeks occur in the early part of some growing seasons. These dry periods may cause moderate to severe losses of newly regenerated or planted trees.

WOODLAND SUITABILITY GROUP 5

This group consists of moderately deep to shallow, well-drained to somewhat excessively drained, sloping to steep soils on uplands. These soils are in the Brassfield, Colyer, and Shrouts series. Many areas are severely eroded.

Site indexes for the rated species are 40 to 50 for oaks and 35 to 45 for eastern redcedar. The average yearly growth per acre is approximately 50 board feet for oaks. Only a low level of management is justified on the soils of this group.

Species to favor in managing existing stands are eastern redcedar, post oak, and Virginia pine.

Species to favor for planting are eastern redcedar and Virginia pine.

The erosion hazard is moderate on slopes of up to 20 percent and is severe on slopes of more than 20 percent.

Equipment limitation, in most areas, is slight on slopes of up to 20 percent, moderate on slopes that range from 20 to 30 percent, and severe on slopes of more than 30 percent.

Plant competition is slight.

Seedling mortality is moderate on slopes of 12 to 30 percent and is severe on slopes of more than 30 percent.

WOODLAND SUITABILITY GROUP 6

This group consists of dominantly deep, well drained to moderately well drained soils on flood plains. These soils are in the Boonesboro, Egam, Huntington, Kickapoo, and Lindside series. They are silt loam to fine sandy loam throughout.

Most trees commonly grown in the uplands and in the lowlands grow equally well on the soils in this group. Upland hardwoods, such as black walnut, yellow-poplar, and upland oaks, are not well suited to a few areas that are subject to flooding of medium duration during the growing season.

Site indexes for the rated species are 90 to 100 for lowland oaks, 100 to 110 for cottonwood, 90 to 100 for sweetgum, and 100 to 110 for yellow-poplar. The average yearly growth per acre is approximately 455 board feet for oaks, 500 board feet for sweetgum, about 720 board feet for cottonwood, and about 550 board feet for yellow-poplar. Intensive management is justified on the soils of this group.

Species to favor in existing stands are the lowland oaks, cottonwood, and sweetgum. Yellow-poplar and black walnut, where they occur on these soils, should also be favored.

The erosion hazard, equipment limitation, and seedling mortality are slight. Flooding in some years hinders operations for a few days at a time late in winter and early in spring.

Plant competition is severe. Because moisture is abundant during the growing season, shade-tolerant trees of low quality become established in the understory of sawlog stands. When the overstory is logged, these low-quality, shade-tolerant trees can prevent the reestablishment or inhibit the growth of desirable trees unless intensive weeding is applied. Interplanting or conversion planting generally is not practical, because competition from undesirable trees is severe. Trees planted in open areas generally require one or more cultivations.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 7

This group consists of dominantly poorly drained and somewhat poorly drained, nearly level soils on bottoms and stream terraces. These soils are in the Blago, Dunning, Lawrence, Melvin, Newark, and Robertsville series. They have a dominantly silt loam surface layer and a silt loam to silty clay subsoil.

Species of trees that are tolerant of excess water in the soil for long periods are well suited to these soils. Hardwoods, such as yellow-poplar and upland oaks, produce fairly well on the soils in this group that are not subject to frequent flooding of long duration.

Site indexes for the rated species are 95 to 105 for lowland oaks, 95 to 105 for cottonwood, 90 to 100 for sweetgum, 85 to 95 for yellow-poplar, and 75 to 85 for upland oaks. The approximate yearly growth per acre is 510 board feet for lowland oaks, 290 board feet for upland oaks, about 650 board feet for cottonwood, 500 board feet for sweetgum, and 450 board feet for yellow-poplar.

The erosion hazard is slight.

Equipment limitation is moderate to severe because a seasonally high water table is at or within 15 inches of the surface for 2 to 6 months or more of the year.

Plant competition is severe. Because moisture is abundant during the growing season, shade-tolerant trees of low quality become established in the understory of sawlog stands. When the overstory is logged, these shade-tolerant trees generally prevent satisfactory reestablishment of desirable trees unless the site is intensively weeded. Interplanting or conversion planting ordinarily is not

feasible, because plant competition is severe. Trees planted in open areas generally require one or more cultivations.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 8

This group consists of moderately well drained, nearly level to sloping, loamy soils on uplands and stream terraces. These soils are in the Berea, Captina, Mercer, and Monongahela series. They are moderately deep to a fragipan, except for the Berea soils, which are moderately deep to black shale.

Site indexes for the rated species are 70 to 80 for upland oaks, 85 to 95 for yellow-poplar, 70 to 80 for shortleaf pine, and 75 to 85 for Virginia pine. The average yearly growth per acre is approximately 250 board feet for upland oaks, 590 board feet for Virginia pine, and 670 board feet for shortleaf pine. Intensive management is justified on the soils of this group.

Species to favor in managing existing stands are yellow-poplar, white oak, northern red oak, black oak, white ash, sugar maple, black walnut, and black cherry.

Species to favor for planting are black locust, black walnut, northern red oak, white ash, yellow-poplar, white pine, and shortleaf pine. Scotch pine is suitable for production of Christmas trees.

The erosion hazard and equipment limitations are slight on most of the soils in this group.

Plant competition is moderate. Because moisture is abundant during the growing season, shade-tolerant trees of low quality become established in the understory of saw-log stands. When the overstory is logged, these shade-tolerant trees commonly prevent the satisfactory reestablishment of desirable trees. To insure the dominance of desirable trees may require one or more weedings. Competition to newly planted trees in open areas that have been abandoned as cropland or pasture for 2 or more years may require a weeding or cultivation to release desirable seedlings from low-quality trees.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 9

This group consists of moderately well drained, sloping soils on uplands. These soils are in the Captina and Mercer series. They are severely eroded and are moderately deep to shallow to a fragipan.

Site indexes for the rated species are 45 to 55 for upland oaks and 55 to 65 for Virginia pine. The average yearly growth per acre is approximately 70 board feet for oaks and about 410 board feet for Virginia pine. Low intensive management is justified on the soils of this group.

Species to favor in managing existing stands are upland oaks and Virginia pine. Virginia pine is favored more than upland oaks in places where these species occur in a mixture.

The species to favor for planting is Virginia pine.

The erosion hazard is moderate, and equipment limitation and plant competition are slight.

Seedling mortality is moderate to severe.

WOODLAND SUITABILITY GROUP 10

This group consists of moderate deep, well-drained, dominantly sloping to strongly sloping soils on uplands. These soils are in the Rarden and Trappist series. They have a moderately fine textured to fine textured subsoil.

Site indexes for the rated species are 60 to 70 for oaks and 65 to 75 for Virginia pine. The average yearly growth per acre is approximately 160 board feet for oaks and 450 board feet for Virginia pine. Medium intensive management is justified on the soils of this group.

Species to favor in managing existing stands are black oak, white oak, shortleaf pine, and Virginia pine.

Species to favor for planting are shortleaf pine, loblolly pine, white pine, and black locust.

The erosion hazard and equipment limitation are moderate.

Plant competition is moderate. The soil-moisture relationships are favorable during the growing season. Shade-tolerant trees that become established in the understory of saw-log stands may compete with and hinder the reestablishment of desirable trees. To insure the dominance of desirable trees may require one or more weedings.

Seedling mortality is slight.

WOODLAND SUITABILITY GROUP 11

This group consists of shallow, excessively drained to well-drained, dominantly moderately steep to very steep soils. These soils are in the Colyer and Weikert series. They have a very shaly or very channery subsoil.

Site indexes for the rated species are 60 to 70 for upland oaks, 60 to 70 for Virginia pine on slopes facing north or east, and 50 to 60 for upland oaks and for Virginia pine on slopes generally facing south or west. The average yearly growth per acre is approximately 160 board feet for oaks and 450 board feet for Virginia pine on slopes facing north or east. On slopes generally facing south or west, the average yearly growth is approximately 90 board feet for oaks and 320 board feet for Virginia pine. Medium intensive management is justified on the soils of this group.

Species to favor in managing existing stands are chestnut oak, white oak, black oak, scarlet oak, Virginia pine, and shortleaf pine.

Species to favor for planting are shortleaf pine, white pine, Virginia pine, and eastern redcedar.

The erosion hazard is moderate on slopes of up to 20 percent and severe on slopes of more than 20 percent.

Equipment limitation is moderate on slopes of up to 20 percent and severe on slopes of more than 20 percent. Use of conventional farm-type equipment is very difficult on steeper slopes. Track-type equipment or power winches are needed to harvest wood crops efficiently on the moderately steep to very steep slopes.

Plant competition is slight on slopes facing the south or west because these soils are droughty, and it is slight to moderate on slopes facing north or east.

Because soils in the group are shallow and droughty, seedling mortality is moderate to severe on slopes facing north or east and severe on slopes facing south or west.

WOODLAND SUITABILITY GROUP 12

This group consists dominantly of shallow, moderately steep to steep soils intermingled with areas of rock outcrop. In this group are the Rock outcrop-Opequon, the Cynthiana-Rock outcrop, and the Fairmount-Rock outcrop complexes.

Except for eastern redcedar, there is little or no demand for the trees that grow on the soils in this group. The extremely rocky areas have no potential for commercial

production of trees. Eastern redcedar and Virginia pine can be planted on these soils where sufficient soil material exists, as determined by onsite inspection.

Site indexes are 40 to 50 for upland oaks and 30 to 50 for eastern redcedar. The average yearly growth per acre is approximately 50 board feet for upland oaks.

The erosion hazard is severe on slopes of more than 20 percent.

Equipment limitation is severe in most areas because of rock outcrop or steep slopes.

Plant competition is slight.

Seedling mortality is severe during dry periods that generally occur in the early part of the growing season and last for 2 to 3 weeks.

WOODLAND SUITABILITY GROUP 13

This group consists of miscellaneous land types that are so variable in origin, soil characteristics, physiography, and behavior and management requirements that onsite inspection is necessary to make interpretations regarding the growth and management of trees. These land types are Alluvial land, steep, Gullied land, and Rock outcrop, shale.

Alluvial land, steep, consists mostly of the streambanks along the Kentucky River. Texture and slope are variable. Potential productivity is generally low for most kinds of trees. Low-quality hardwoods, such as willow, silver maple, and sycamore, can be grown in most places but only to help control erosion. A few areas may be suited to species of commercial value.

Gullied land consists of areas that are severely scarred by moderately deep or deep gullies. A few patches of the original soil remain between the gullies, but in most places erosion has destroyed it. The potential productivity is very low for most kinds of trees. Shortleaf pine, loblolly pine, and Virginia pine grow slowly and provide some protection and ground cover. Gullied areas can occur on any slope but are most common where the original soils were strongly sloping to steep.

Rock outcrop, shale, consists of a 1- to 6-inch layer of weathered, black shale over hard, black shale. Trees are not suited to this mapping unit.

Use of Soils for Wildlife

This section deals with the suitability of the soils in Madison County for growing plants that furnish food and cover for wildlife. It explains the relationship between wildlife management and soils, defines the suitability ratings used to evaluate the soils for wildlife habitat elements, discusses the different wildlife habitat elements, defines the classes of wildlife, and includes a table showing numerical ratings of the soils for the elements of wildlife habitat and the kinds of wildlife.

The principal kinds of wildlife in Madison County are cottontail rabbit, gray squirrel, fox squirrel, raccoon, opossum, skunk, red fox, gray fox, mink, muskrat, bobwhite quail, mourning dove, and several species of ducks and geese. There are also many species of song or insectivorous birds and nongame mammals. An occasional white-tailed deer, ruffed grouse, and wild turkey is seen.

In the streams of the county are the usual variety of warm-water game fish, pan fish, and rough fish commonly found throughout the State. Examples of these are largemouth bass, bluegill, and bullhead, respectively. Most of the farm ponds have been stocked with largemouth bass and bluegill.

Successful management of wildlife on any tract of land requires that food, cover, and water, among other things, are available in a suitable combination. Lack of any one of these necessities, an unfavorable balance between any two of them, or inadequate distribution of them, may severely limit or account for the absence of desired wildlife species. Information on soils is valuable in creating, maintaining, or improving suitable food, cover, and water for wildlife.

Most wildlife habitats are managed by planting suitable vegetation, by manipulating existing vegetation so as to bring about natural establishment, increase, or improvement of desired plants, or by combinations of such measures. The influence of many kinds of soils on the growth of plants is known, and it can be inferred for other soils from a knowledge about the characteristics and behavior of the soil. In addition, soil information is useful in creating water areas or improving natural ones as wildlife habitat useful for these purposes.

Soil interpretations for wildlife habitats aid in selecting the more suitable sites for various kinds of habitat management and serve as indicators of the level of management needed to achieve satisfactory results. They also serve as a means of showing why it may not generally be feasible to manage a particular area for a given kind of wildlife.

These interpretations also may serve in broad-scale planning for wildlife management areas, parks and nature areas, or for acquiring wildlife lands. By means of map overlay, suitabilities or groupings of individual habitat elements can be made.

The soil areas shown on the soil map are rated without regard to positional relationships with adjoining mapped areas. The size, shape, and location of the outlined areas do not affect the rating. The influences on habitats of certain factors, such as elevation and aspect, must be appraised at the site.

In table 3, the soils of Madison County are rated for their relative suitability for the creation, maintenance, or improvement of eight wildlife habitat elements and for three main classes of wildlife; namely, openland, woodland and wetland. These ratings are based on limitations imposed by the characteristics or behavior of the soil. Three levels of suitability are recognized. It also is recognized that certain adverse conditions render a site unsuited to a particular habitat element. Numerical ratings of 1 to 4 indicate the degree of soil suitability for a given habitat element. They also indicate the relative extent of soil limitations.

For specific detail on characteristics of the soils, refer to the section "Descriptions of the Soils."

Special attention is directed to the rating of the habitat element, coniferous woody plants. Considerable evidence indicates that under situations of *slow* growth and *delayed* canopy closure, coniferous habitats support larger numbers and varieties of wildlife than where growth and canopy closure are rapid. For this reason, soil properties that tend to promote rapid growth and canopy closure are classified as limitations to the use and management of a soil for wildlife.

In general, soils favorable to quick establishment of conifers and their growth require more intensive manage-

TABLE 3.—*Suitability of soils for elements of wildlife habitat and kinds of wildlife*

[A rating of 1 denotes well suited or above average; 2 denotes suited or average; 3 denotes poorly suited or below average; and 4 denotes not suited. Gullied land (Gu); Rock outcrop (in CyE, FaF, and RoE); and Rock outcrop, shale (Rs), have not been rated and require onsite investigation]

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Alluvial land, steep: AlF	3	3	3	3	1	4	4	4	3	3	4
Beasley:											
BaB, BaC	2	1	1	1	3	4	4	4	1	1	4
BaD	3	1	1	1	3	4	4	4	1	1	4
BcC3	3	2	1	1	3	4	4	4	2	2	4
BcD3	4	2	1	1	3	4	4	4	2	2	4
Berea:											
BeA	2	1	1	1	3	3	3	3	1	1	3
BeB, BeC	2	1	1	1	3	4	4	4	1	1	4
Blago: Bg	4	3	3	1	1	1	1	1	3	1	1
Boonesboro: Bo	2	1	1	1	3	3	4	4	1	1	4
Brassfield:											
BrC	3	2	1	1	3	4	4	4	2	2	4
BrE, BrF	4	3	1	1	3	4	4	4	3	2	4
Calcast: CaB, CaC	2	1	1	1	3	4	4	4	1	1	4
Caneyville: CeF	4	4	2	2	2	4	4	4	3	3	4
Captina:											
CnA	2	1	1	1	3	3	3	3	1	1	3
CnB, CnC	2	1	1	1	3	4	4	4	1	1	4
CnC3	3	2	1	1	3	4	4	4	2	2	4
Colyer:											
CoF	4	3	2	2	2	4	4	4	3	2	4
CsF3	4	4	3	3	3	4	4	4	3	3	4
Culleoka:											
CuB, CuC	2	1	1	1	3	4	4	4	1	1	4
CuD	3	2	1	1	3	4	4	4	2	2	4
CwE, CwF	4	3	1	1	3	4	4	4	3	2	4
Cynthiana: CyE (Cynthiana part of CyE.)	4	3	2	2	2	4	4	4	4	2	4
Dunning: Du	4	3	3	1	1	1	2	4	3	1	3
Eden:											
EdD2	3	1	1	1	2	4	4	4	1	1	4
EeE2, EeF2	4	2	1	1	2	4	4	4	2	1	4
Egam: Eg	2	2	1	1	3	2	2	2	1	2	2
Elk:											
ElA	1	1	1	1	3	4	4	4	1	1	4
ElB, ElC	2	1	1	1	3	4	4	4	1	1	4
ElD	3	2	1	1	3	4	4	4	2	2	4
Fairmount: FaF (Fairmount part of FaF.)	4	4	2	2	2	4	4	4	4	2	4
Faywood:											
FdC	2	1	1	1	3	4	4	4	1	1	4
FdE	3	2	1	1	3	4	4	4	2	2	4

TABLE 3.—*Suitability of soils for elements of wildlife habitat and kinds of wildlife*—Continued

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Hagerstown: HaB, HaC	2	1	1	1	3	4	4	4	1	1	4
Huntington: Hu	1	1	1	1	3	4	4	4	1	1	4
Kickapoo: Kp	1	1	1	1	3	4	4	4	1	1	4
Lawrence: Lc	3	3	2	1	3	2	2	2	3	2	2
Lindside: Ld	2	1	1	1	3	3	3	3	1	1	3
Lowell:											
LwB, LwC	2	1	1	1	3	4	4	4	1	1	4
LwD	3	1	1	1	3	4	4	4	1	1	4
LyE3	4	2	1	1	3	4	4	4	2	2	4
McAfee:											
MnC	2	1	1	1	3	4	4	4	1	1	4
MnD	3	2	1	1	3	4	4	4	2	2	4
Melvin: Mt	3	2	2	1	2	2	2	4	2	1	2
Mercer:											
MuA	2	1	1	1	3	3	3	3	1	1	3
MuB, MuC	2	1	1	1	3	4	4	4	1	1	4
MvC3	3	2	1	1	3	4	4	4	2	2	4
Monongahela:											
MwA	2	1	1	1	3	3	3	3	1	1	3
MwB, MwC	2	1	1	1	3	4	4	4	1	1	4
Newark: Ne	2	2	2	1	3	2	2	3	2	2	2
Nicholson: NhB, NhC	2	1	1	1	3	4	4	4	1	1	4
Opequon (Opequon part of RoE.)	3	4	2	2	2	4	4	4	4	2	4
Otway:											
OtC	2	1	1	1	2	4	4	4	1	1	4
OtE, OtF	4	2	1	1	2	4	4	4	2	1	4
Rarden:											
RaC	2	2	1	2	2	4	4	4	1	2	4
RaD2	3	2	1	2	2	4	4	4	2	2	4
Robertsville: Rb	3	3	2	2	2	1	1	1	3	2	1
Rockcastle: RcC, RcD, RcE	4	3	2	2	2	4	4	4	4	2	4
Shelbyville:											
ShA	1	1	1	1	3	4	4	4	1	1	4
ShB, ShC	2	1	1	1	3	4	4	4	1	1	4
Shelocta: SlD	3	2	1	1	3	4	4	4	2	2	4
Shrouts: SrC, SrE, SuE3	4	3	2	2	2	4	4	4	4	2	4
Tate:											
TaB, TaC	2	1	1	1	3	4	4	4	1	1	4
TaD2	3	2	1	1	3	4	4	4	2	2	4

TABLE 3.—*Suitability of soils for elements of wildlife habitat and kinds of wildlife*—Continued

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Trappist:											
TrB, TrC	2	1	1	1	3	4	4	4	1	1	4
TrD	3	2	1	1	3	4	4	4	2	2	4
TsC3	3	2	2	2	2	4	4	4	2	2	4
Weikert: WeG	4	4	2	2	2	4	4	4	3	3	4
Whitley:											
WhB, WhC	2	1	1	1	3	4	4	4	1	1	4
WhD	3	2	1	1	3	4	4	4	2	2	4
Woolper:											
WoB, WoC	2	1	1	1	3	4	4	4	1	1	4
WpE	4	3	1	1	3	4	4	4	3	2	4

ment if results for long-term use by wildlife are to be satisfactory. Therefore, on soils rated poorly suited for coniferous woody plants, a temporary or short-term value as wildlife habitat may be easy to establish.

Habitat suitability ratings

The following paragraph describes the ratings in table 3.

Soils rated 1 are *well suited* to the specified element of wildlife habitat. Generally, only management of low intensity is needed for the creation, maintenance, or improvement of the specified habitat element, and satisfactory results can be expected. Soils rated 2 are *suited* to the specified element. Fairly frequent attention and moderate management are required for satisfactory results. Soils rated 3 are *poorly suited* and have severe limitations to use for the specified habitat element. The creation, maintenance, or improvement of the habitat element is difficult, may be expensive, and requires intensive effort for satisfactory results. Soils rated 4 are *unsuited* because limitations are so extreme that successful management for the specified element is highly impractical.

Habitat elements

In the following paragraphs the wildlife habitat elements rated in table 3 are briefly described.

Grain and seed crops are agricultural grains or seed-producing annuals that are planted to produce food for wildlife. Suitable plants are corn, sorghums, wheat, oats, millet, buckwheat, soybeans, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife food and cover. Suitable plants are fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and panicgrasses.

Wild herbaceous upland plants are native or introduced perennial grasses and forbs (weeds) that provide food and cover principally to upland forms of wildlife and that are established mainly through natural processes. Examples of these plants are bluestem, indiangrass, wheatgrass, wild ryegrass, oatgrass, pokeweed, strawberry, lespedeza, beggarweed, wild bean, nightshade, goldenrod, and dandelion.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs (browse), or foliage used extensively as food by wildlife. These commonly are established through natural processes but also may be planted. Examples of these plants are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grape, honeysuckle, blueberry, brier, greenbrier, autumn-olive, and multiflora rose.

Coniferous woody plants are cone-bearing trees and shrubs that are important to wildlife mainly as cover, but also may furnish food in the form of browse, seeds, or fruitlike cones. These plants commonly are established through natural processes but also may be planted. As explained in the introductory paragraphs, soils that are well suited for coniferous wildlife habitat are those in which plants grow slowly and closure of the canopy is delayed. Examples of these plants are pine, hemlock, and redcedar.

Wetland food and cover plants are annual and perennial, wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover that is extensively and dominantly used by wetland forms of wildlife. Examples of these plants are smartweed, wild millet, bulrush, spike-sedge, rushes, sedges, burreeds, wildrice, rice cutgrass, mannagrass, and cattails.

Shallow water developments are areas of water in impoundments or excavations that generally do not exceed 6 feet in depth. Structures include low dikes, levees, shallow dugouts, level ditches, and devices for controlling the water level in marshy drainageways or channels.

Excavated ponds are dug-out areas or combinations of dug-out ponds and low dikes or dams that hold enough water of suitable quality and depth to support fish or other wildlife. Examples are ponds of one-fourth acre that are built on nearly level soils and that have an average depth of 6 feet for at least one-fourth of the area. A de-

pendable high water table or other source of water is needed.

Classes of wildlife

Table 3 also includes ratings of selected habitat elements that indicate the relative value of each soil for the three main classes of wildlife. These classes are defined as follows:

Openland wildlife consists of birds and mammals that normally frequent cropland, pastures, meadows, lawns, and areas overgrown with grasses, herbs, and shrubby plants. Examples of these forms are quail, meadowlarks, field sparrows, doves, cottontail rabbits, red fox, and woodchucks.

Woodland wildlife consists of birds and mammals that normally frequent woodland made up of hardwood trees and shrubs, coniferous trees and shrubs, or mixtures of such plants. Examples of these forms are ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, gray squirrels, gray fox, white-tailed deer, raccoon, and wild turkey.

Wetland wildlife consists of birds and mammals that normally frequent wet areas such as ponds, marshes, and swamps. Examples of these forms are ducks, geese, herons, shore birds, mink, muskrat, and beaver.

Engineering Uses of Soils [4]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as structural material or as foundation material. In this section are those properties of the soils that affect construction and maintenance of roads and airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. Among the soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, available moisture capacity, grain-size distribution, plasticity, and reaction. Depth to seasonal high water table and depth to bedrock are also important.

Information concerning these and related soil properties are furnished in tables 4 and 5. The estimates and interpretations of soil properties in these tables can be used in:

1. Planning and designing of agricultural drainage systems, farm ponds, irrigation systems, diversion terraces, and other structures for controlling water and conserving soil.
2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating probable sources of sand, gravel, or rock suitable for use as construction material.
4. Selecting potential industrial, commercial, residential, and recreational areas.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works that involve heavy loads and where the excavations are deeper than the depths of layers reported here. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that may be expected.

The soil or soils represented by a map symbol can be reasonably expected to make up the major part of a delineated area, but small areas of other soils were included in mapping in some places.

Some of the terms used by soil scientists may not be familiar to engineers, and some terms may have special meaning in soil science. Several of these terms are defined in the Glossary at the back of this soil survey.

Engineering classification of soils

The two systems most commonly used in classifying samples of soil horizons for engineering are the AASHO system (*1*, *10*) adopted by the American Association of State Highway Officials and the Unified system (*18*, *10*) used by the SCS engineers, Department of Defense, and others.

The AASHO system is used to classify soils according to those properties that affect use in highway construction. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation), and in group 7 are clay soils that have low strength when wet. The best soils for subgrade are therefore classified as A–1, the next best A–2, and so on to class A–7, the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. If soil material is near a classification boundary it is given a symbol showing both classes; for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest.

In the Unified system, soils are classified according to particle-size, distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are 8 classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; 6 classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CH or MH and MH–CH. The latter dual symbol example indicates that the plastic index-liquid limit point is within 2 points of the "A" line. The "A" line chart is explained in the PCA Soil Primer (*10*).

The estimated AASHO and Unified classification of the soils mapped in the survey area are shown in table 4.

Engineering properties of soils

Table 4 provides estimated engineering properties of the soils. The properties are shown for a typical profile of each soil series. A complete description of each soil is given in the section "Description of the Soils." The estimates are based on field classification and descriptions, on test data from comparable soils in adjacent areas, and on field experience. The information applies specifically to soil depths indicated in table 4, but it is reasonably reliable to a depth of about 6 feet for most soils, and more for others.

[4] RICHARD L. QUIGGINS, area engineer, Soil Conservation Service, assisted in preparing this section.

TABLE 4.—*Estimated engineering*

[Alluvial land, steep (AlF), Gullied land (Gu), Rock outcrop (in mapping units CyE, FaF, and RoE), and Rock

Soil series and map symbols [1]	Depth to—		Depth from surface (typical profile)	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified [2]	AASHO [2]
	Feet	*Feet*	*Inches*			
Beasley: BaB, BaC, BaD, BcC3, BcD3.	4–6	(3)	0–10	Silt loam	ML or CL	A–4 or A–6
			10–16	Silty clay loam	CL or CH	A–7
			16–34	Silty clay or clay	CH	A–7
			34–48	Loam	ML or CL	A–4 or A–6
Berea: BeA, BeB, BeC	1½–3½	1–2	0–6	Silt loam	ML	A–4 or A–6
			6–28	Silty clay loam	ML or CL	A–6
			28–31	Silty clay loam	ML or CL	A–6
			31	Black shale.		
Blago: Bg	4–8	0–½	0–18	Silt loam	ML or CL	A–4 or A–6
			18–40	Silty clay or clay	MH or CL	A–7
			40–54	Clay	CH or CL	A–7
			54	Black shale.		
Boonesboro: Bo	1½–3½	[5] 4+	0–22	Silt loam	ML or CL	A–4 or A–6
			22–31	Very gravelly silt loam	GM or GC	A–1 or A–2
			31	Limestone.		
Brassfield: BrC, BrE, BrF	1½–3½	(3)	0–18	Silt loam	ML or CL	A–4 or A–6
			18–36	Silt loam or loam	ML or CL	A–4 or A–6
			36	Siltstone, sandstone, and limestone.		
Calcast: CaB, CaC	3½–7+	(3)	0–8	Silt loam	ML or CL	A–4 or A–6
			8–25	Silty clay loam or silty clay	CL or CH	A–7
			25–46	Clay	CH	A–7
Caneyville: CeF	1½–3½	(3)	0–6	Silt loam	ML or CL	A–4 or A–6
			6–30	Silty clay	MH or CH	A–7
			30	Siltstone.		
Captina: CnA, CnB, CnC, CnC3.	3½–6+	1½–2	0–6	Silt loam	ML	A–4
			6–20	Heavy silt loam	ML or CL	A–4 or A–6
			20–48	Heavy silt loam	ML or CL	A–4 or A–6
Colyer: CoF, CsF3	½–1½	(3)	0–5	Shaly silt loam	ML or CL	A–4 or A–6
			5–20	Shaly heavy silty clay loam	CL, CH or GC	A–2 or A–7
			20	Black shale.		
Culleoka: CuB, CuC, CuD, CwE, CwF.	1½–3½	(3)	0–13	Silt loam	ML	A–4
			13–26	Light silty clay loam	ML or CL	A–6
			26–36	Light silty clay loam	ML or CL	A–6
			36	Siltstone and sandstone.		
Cynthiana: CyE	½–1½	(3)	0–4	Silty clay loam	CL	A–7
			4–16	Silty clay or clay	CL or CH	A–7
			16	Limestone.		
Dunning: Du	6+	[5] 0–½	0–18	Silty clay loam	CL or MH	A–7
			18–48	Silty clay or clay	CL or CH	A–7

See footnotes at end of table.

properties of the soils

outcrop, shale (Rs), are so variable that their properties are not estimated. The symbol < denotes less than]

Percentage passing sieve [2]— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Concrete corrosivity
				Inches per hour	*Inches per inch of soil*	*pH*		
100	100	90–100	85–95	0. 63–2. 0	0. 19–0. 21	5. 6–6. 0	Low	Moderate.
100	100	90–100	85–95	0. 2–0. 63	0. 16–0. 19	5. 6–6. 0	Moderate	Moderate.
100	100	95–100	85–95	<0. 2	0. 13–0. 16	5. 6–6. 5	Moderate to high	Moderate.
100	100	85–95	70–95	0. 2–0. 63	0. 14–0. 16	[4]	Moderate	Low.
100	100	90–100	85–95	0. 63–2. 0	0. 19–0. 21	4. 5–6. 0	Low	High.
95–100	90–100	85–100	80–95	0. 63–2. 0	0. 17–0. 19	4. 5–5. 0	Low	High.
75–100	75–100	75–100	70–95	<0. 2	0. 17–0. 19	4. 5–5. 0	Moderate	High.
100	100	95–100	85–95	0. 63–2. 0	0. 20–0. 22	4. 5–5. 5	Low	High.
100	100	95–100	85–95	0. 06–0. 2	0. 14–0. 17	4. 5–5. 0	Moderate	High.
100	100	95–100	90–100	<0. 2	0. 13–0. 16	4. 5–5. 0	Moderate	High.
100	100	90–100	80–90	0. 63–2. 0	0. 20–0. 22	6. 6–7. 3	Low	Low.
45–65	35–50	30–40	20–30	2. 0–6. 3	0. 07–0. 11	7. 4–7. 8	Low	Low.
85–90	80–90	75–85	60–80	0. 63–2. 0	0. 15–0. 17	7. 4–8. 4	Low	Low.
80–90	75–85	70–80	50–75	0. 63–2. 0	0. 10–0. 12	7. 4–8. 4	Low	Low.
100	100	90–100	70–90	0. 63–2. 0	0. 20–0. 22	5. 6–6. 5	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 0	0. 16–0. 18	5. 6–6. 5	Moderate	Moderate.
100	100	95–100	85–95	<0. 2	0. 13–0. 16	5. 6–6. 5	Moderate to high	Moderate.
80–95	75–95	70–95	65–90	0. 63–2. 0	0. 16–0. 18	5. 6–6. 5	Low	Moderate.
60–90	60–90	60–90	55–85	0. 2–0. 63	0. 11–0. 13	5. 6–6. 5	Moderate	Moderate.
95–100	95–100	90–100	75–95	0. 63–2. 0	0. 18–0. 20	4. 5–5. 0	Low	High.
95–100	95–100	90–100	80–95	0. 63–2. 0	0. 18–0. 20	4. 5–5. 0	Low	High.
95–100	95–100	90–100	85–95	<0. 2	0. 13–0. 15	4. 5–5. 0	Low	High.
85–95	80–85	80–85	65–75	0. 63–2. 0	0. 19–0. 21	4. 5–5. 0	Low	High.
30–60	25–60	25–60	20–60	0. 63–2. 0	0. 12–0. 14	4. 5–5. 0	Low to moderate	High.
100	100	85–100	70–90	0. 63–2. 0	0. 19–0. 21	5–6–6. 0	Low	Moderate.
95–100	85–100	90–95	70–90	0. 63–2. 0	0. 17–0. 19	5. 1–6. 0	Low	Moderate.
80–90	80–90	75–90	65–85	0. 63–2. 0	0. 15–0. 17	5. 6–7. 3	Low	Moderate.
90–100	90–100	85–100	75–85	0. 2–0. 63	0. 18–0. 20	6. 1–7. 3	Moderate	Low.
85–95	80–90	80–90	80–90	0. 2–0. 63	0. 10–0. 13	6. 6–7. 8	Moderate to high	Low.
100	100	95–100	90–95	0. 2–0. 63	0. 19–0. 21	6. 6–7. 3	Moderate	Low.
100	100	95–100	90–95	<0. 2	0. 14–0. 16	6. 6–7. 3	Moderate to high	Low.

TABLE 4.—*Estimated engineering*

Soil series and map symbols [1]	Depth to— Bedrock	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification: USDA texture	Classification: Unified [2]	Classification: AASHO [2]
	Feet	*Feet*	*Inches*			
Eden:[7] EdD2, EeE2, EeF2	4–6	(3)	0–4	Silty clay loam	CL	A–7
			4–12	Silty clay or clay	CH or MH	A–7
			12–48	Clay	CH or MH	A–7
Egam: Eg	6+	[5] 2–3	0–20	Silty clay loam	CL	A–6 or A–7
			20–47	Silty clay or silty clay loam	CL or MH	A–7
Elk: ElA, ElB, ElC, ElD	6+	4+	0–10	Silt loam	ML	A–4
			10–48	Silty clay loam	CL or ML	A–4 or A–6
Fairmount: FaF	1–1½	(3)	0–6	Silty clay loam	CL	A–7
			6–16	Silty clay or clay	CL or CH	A–7
			16	Limestone.		
Faywood: FdC, FdE	1½–3½	(3)	0–5	Silt loam	ML or CL	A–7
			5–30	Silty clay or clay	CL or CH	A–7
			30	Limestone.		
Hagerstown: HaB, HaC	5–7+	(3)	0–10	Silt loam	ML or CL	A–6
			10–36	Silty clay	CL or MH	A–7
			36–60	Clay	CH	A–7
Huntington: Hu	3½–7+	[5] 4+	0–44	Silt loam	ML or CL	A–4 or A–6
Kickapoo: Kp	6+	4+	0–48	Fine sandy loam	SM	A–2 or A–4
Lawrence: Lc	4–7+	½–1½	0–18	Silt loam to light silty clay loam.	ML or CL	A–4 or A–6
			18–48	Silty clay loam	CL	A–6 or A–7
Lindside: Ld	4–7+	[5] 2–3	0–48	Silt loam	ML or CL	A–4 or A–6
Lowell: LwB, LwC, LwD, LyE3.	3½–7+	(3)	0–8	Silt loam	ML or CL	A–6
			8–24	Silty clay loam and silty clay.	CL or CH	A–7
			24–48	Clay	CH	A–7
McAfee: MnC, MnD	1½–3½	(3)	0–7	Silt loam	ML or CL	A–4 or A–6
			7–18	Silty clay loam	ML or CL	A–7
			18–27	Silty clay	CL	A–7
			27	Limestone.		
Melvin: Mt	5–7+	[5] 0–½	0–24	Silt loam	ML or CL	A–4
			24–48	Silty clay loam	CL	A–4 or A–6
Mercer: MuA, MuB, MuC, MvC3.	5–6+	1½–2	0–13	Silt loam	ML or CL	A–4 or A–6
			13–22	Light silty clay loam	ML or CL	A–6
			22–42	Silty clay loam	ML or CL	A–7
			42–60	Silty clay or clay	MH or CH	A–7
Monongahela: MwA, MwB, MwC.	3–6+	1½–2	0–7	Fine sandy loam	SM or ML	A–4
			7–20	Loam	ML or CL	A–4 or A–6
			20–28	Clay loam	ML or CL	A–6
			28–48	Loam	ML or CL	A–4 or A–6
Newark: Ne	4–7+	[5] ½–1½	0–16	Silt loam	ML or CL	A–4 or A–6
			16–48	Heavy silt loam to silty clay loam.	CL	A–6

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve [2]—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Concrete corrosivity
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	*Inches per hour*	*Inches per inch of soil*	*pH*		
90–100	90–100	90–100	85–95	0. 63–2. 0	0. 18–0. 20	6. 6–7. 3	Moderate	Low.
85–95	85–95	85–95	80–90	0. 63–2. 0	0. 15–0. 18	6. 6–7. 3	Moderate to high	Low.
75–90	75–90	75–90	70–90	<0. 2	0. 14–0. 16	7. 4–7. 8	Moderate to high	Low.
100	100	95–100	90–100	0. 63–2. 0	0. 19–0. 21	6. 1–7. 3	Moderate	Low.
100	100	95–100	90–100	<0. 2	0. 17–0. 19	6. 1–7. 3	Moderate	Low.
100	100	95–100	80–90	0. 63–2. 0	0. 19–0. 21	5. 6–6. 0	Low	Moderate.
100	100	100	85–95	0. 63–2. 0	0. 17–0. 19	5. 1–6. 0	Low	Moderate.
85–95	85–95	85–95	80–90	0. 2–0. 63	0. 15–0. 17	7. 4–7. 8	Low	Low.
80–95	80–95	80–95	75–90	0. 2–0. 63	0. 12–0. 14	7. 4–8. 2	Moderate to high	Low.
100	100	95–100	85–95	0. 63–2. 0	0. 19–0. 21	5. 1–6. 0	Moderate	Moderate.
100	100	95–100	90–95	0. 2–0. 63	0. 14–0. 16	5. 1–6. 5	Moderate	Moderate.
100	100	95–100	80–90	0. 63–2. 0	0. 20–0. 22	5. 6–6. 0	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 0	0. 14–0. 16	5. 6–6. 0	Moderate	Moderate.
100	100	95–100	85–95	0. 2–0. 63	0. 13–0. 15	5. 6–6. 0	Moderate	Moderate.
100	100	95–100	85–95	0. 63–2. 0	0. 20–0. 22	6. 1–7. 8	Low	Low.
100	100	70–85	30–50	2. 0–6. 3	0. 13–0. 15	6. 6–7. 3	Low	Low.
100	100	95–100	85–100	0. 63–2. 0	0. 19–0. 21	4. 5–5. 5	Low	High.
100	100	95–100	90–100	<0. 2	0. 10–0. 15	4. 5–5. 0	Low	High.
100	100	100	80–90	0. 63–2. 0	0. 20–0. 22	6. 6–7. 3	Low	Low.
100	100	95–100	90–100	0. 63–2. 0	0. 20–0. 22	5. 1–6. 0	Low	Moderate.
100	100	95–100	90–100	0. 63–2. 0	0. 16–0. 18	5. 1–6. 0	Moderate	Moderate.
100	100	100	95–100	<0. 2	0. 12–0. 15	5. 1–7. 3	High	Moderate.
100	100	95–100	70–90	0. 63–2. 0	0. 20–0. 22	5. 6–6. 5	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 0	0. 19–0. 21	5. 6–6. 5	Low to moderate	Low.
100	95–100	95–100	90–95	0. 2–0. 63	0. 15–0. 17	6. 1–7. 3	Moderate	Low.
100	100	90–100	85–95	0. 63–2. 0	0. 20–0. 22	5. 1–7. 3	Low	Low to moderate.
100	100	90–100	85–95	0. 63–2. 0	0. 19–0. 21	5. 1–7. 3	Low	Low to moderate.
100	100	95–100	90–95	0. 63–2. 0	0. 20–0. 22	5. 1–6. 0	Low	Moderate.
100	100	95–100	90–95	0. 63–2. 0	0. 19–0. 21	5. 1–6. 0	Low	Moderate.
100	95–100	95–100	85–95	<0. 2	0. 10–0. 15	5. 1–6. 0	Low to moderate	Moderate.
100	100	95–100	90–100	<0. 2	0. 14–0. 16	5. 6–6. 0	Moderate	Moderate.
100	100	70–85	40–55	0. 63–2. 0	0. 14–0. 16	4. 5–5. 0	Low	High.
100	100	85–95	60–75	0. 63–2. 0	0. 16–0. 18	<4. 5–5. 0	Low	High.
100	100	90–100	70–80	<0. 2	0. 10–0. 15	<4. 5–5. 0	Low	High.
100	100	85–95	60–75	<0. 2	0. 10–0. 15	<4. 5–5. 0	Low	High.
100	100	90–100	90–95	0. 63–2. 0	0. 20–0. 22	6. 1–7. 8	Low	Low.
100	100	90–100	85–95	0. 63–2. 0	0. 19–0. 21	6. 1–7. 8	Low	Low.

TABLE 4.—*Estimated engineering*

Soil series and map symbols [1]	Depth to— Bedrock	Depth to— Seasonal high water table	Depth from surface (typical profile)	Classification: USDA texture	Classification: Unified [2]	Classification: AASHO [2]
	Feet	*Feet*	*Inches*			
Nicholson: NhB, NhC	5–7	2–3	0–7	Silt loam	ML or CL	A–4 or A–6
			7–29	Silty clay loam	CL	A–6
			29–47	Silty clay loam	CL	A–6
			47–52	Heavy silty clay loam or silty clay.	CL or MH	A–6 or A–7
Opequon (Opequon part of RoE)	1–1½	(3)	0–6	Silt loam	ML or CL	A–4 or A–6
			6–20	Silty clay or clay	MH or CH	A–7
			20	Limestone.		
Otway: OtC, OtE, OtF	1½–3½	(3)	0–7	Silty clay	CH or CL	A–7
			7–38	Heavy silty clay loam	MH or CL	A–7
			38	Limestone, siltstone, and shale.		
Rarden: RaC, RaD2	1½–3½	(3)	0–9	Heavy silt loam to light silty clay loam.	ML or CL	A–4 or A–6
			9–38	Clay	CH or CL	A–7
			38	Shale.		
Robertsville: Rb	4–6+	0–½	0–15	Silt loam	ML	A–4
			15–48	Silty clay loam	ML or CL	A–6 or A–7
Rockcastle: RcC, RcD, RcE	1½–3½	(3)	0–5	Silt loam	ML or CL	A–4 or A–6
			5–27	Clay	CH or CL	A–7
			27	Shale.		
Shelbyville: ShA, ShB, ShC	5–8+	(3)	0–14	Silt loam	ML or CL	A–4 or A–6
			14–30	Light silty clay loam	CL	A–6 or A–7
			30–48	Silty clay or clay	CH or MH	A–7
Shelocta: SlD	3–6+	(3)	0–44	Gravelly silt loam	ML or GM	A–2 or A–4
Shrouts: SrC, SrE, SuE3	5–7+	(3)	0–10	Silty clay loam or silty clay	ML or CL	A–7
			10–48	Clay	CL or CH	A–7
Tate: TaB, TaC, TaD2	3½–6+	(3)	0–14	Fine sandy loam	SM	A–4
			14–36	Clay loam	ML or CL	A–6
			36–44	Loam	ML or CL	A–4 or A–6
			44–48	Fine sandy loam	SM or SC	A–4
Trappist: TrB, TrC, TrD, TsC3.	1½–3½	(3)	0–6	Silt loam	ML	A–4
			6–14	Heavy silty clay loam	CL or MH–CH	A–6 or A–7
			14–30	Heavy silty clay loam	CL or MH–CH	A–6 to A–7
			30	Black shale.		
Weikert: [8] WeG	1–1½	(3)	0–12	Channery silt loam	GM or ML	A–4
			12–18	Channery silt loam	GM	A–4
			18	Siltstone.		
Whitley: WhB, WhC, WhD	3½–6	(3)	0–16	Silt loam	ML	A–4
			16–44	Silty clay loam	ML or CL	A–6
			44	Black shale.		
Woolper: [9] WoB, WoC, WpE	4–8+	3+	0–8	Silty clay loam	ML or CL	A–7
			8–42	Silty clay	CL or CH	A–7

[1] See soil descriptions for information about kind of rock and other detailed information about the soils.
[2] All fragments larger than 3 inches are excluded in estimates.
[3] Water table estimated to be at a depth of more than 6 feet.
[4] Calcareous.
[5] Soils are subject to flooding.

properties of the soils—Continued

Percentage passing sieve [2]—				Permea-bility	Available moisture capacity	Reaction	Shrink-swell potential	Concrete corrosivity
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					
				Inches per hour	*Inches per inch of soil*	*pH*		
100	100	95–100	85–95	0. 63–2. 0	0. 20–0. 22	5. 1–5. 5	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 0	0. 19–0. 21	4. 5–5. 0	Low	High.
95–100	95–100	95–100	85–95	<0. 2	0. 12–0. 14	4. 5–5. 0	Low	High.
95–100	95–100	95–100	85–95	0. 2–0. 63	0. 14–0. 18	4. 5–5. 0	Moderate	High.
100	100	100	70–90	0. 63–2. 0	0. 19–0. 21	5. 6–6. 5	Low to moderate	Moderate.
95–100	95–100	90–100	85–95	0. 2–0. 63	0. 13–0. 17	5. 6–8. 4	Moderate	Moderate.
95–100	95–100	90–95	85–90	0. 2–0. 63	0. 16–0. 18	7. 4–8. 4	Moderate	Low.
75–95	75–95	75–95	70–85	0. 2–0. 63	0. 16–0. 18	7. 4–8. 4	Moderate to low	Low.
100	100	95–100	90–100	0. 63–2. 0	0. 19–0. 21	4. 5–5. 0	Low to moderate	High.
85–95	85–95	85–95	80–95	<0. 2	0. 13–0. 15	4. 5–5. 0	Moderate to high	High.
100	100	90–100	70–90	0. 63–2. 0	0. 20–0. 22	4. 5–5. 5	Low	Moderate or high.
100	100	95–100	85–95	<0. 06	0. 10–0. 15	4. 5–5. 5	Low	Moderate or high.
100	100	95–100	90–100	0. 63–2. 0	0. 18–0. 20	4. 5–5. 0	Low	High.
75–90	70–90	65–90	60–85	<0. 2	0. 12–0. 14	4. 5–5. 0	Moderate	High.
100	100	95–100	85–95	0. 63–2. 0	0. 20–0. 22	5. 6–6. 0	Low	Moderate.
100	100	95–100	85–95	0. 63–2. 0	0. 19–0. 21	5. 6–6. 0	Moderate	Moderate.
90–100	85–95	85–95	80–95	0. 2–0. 63	0. 14–0. 16	5. 6–6. 0	Moderate	Moderate.
55–80	50–75	45–70	30–60	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	Low	High.
100	100	95–100	95–100	0. 2–0. 63	0. 17–0. 19	6. 6–7. 8	Moderate	Low.
95–100	90–100	90–100	85–95	<0. 2	0. 13–0. 15	7. 4–8. 4	High	Low.
100	100	60–70	40–50	0. 63–2. 0	0. 13–0. 15	4. 5–5. 0	Low	High.
100	100	90–100	70–80	0. 63–2. 0	0. 16–0. 18	4. 5–5. 0	Low	High.
100	100	85–95	60–75	0. 63–2. 0	0. 15–0. 17	4. 5–5. 0	Low	High.
100	100	60–70	40–50	2. 0–6. 3	0. 13–0. 15	4. 5–5. 0	Low	High.
100	100	95–100	70–90	0. 63–2. 0	0. 19–0. 21	4. 5–5. 0	Low	High.
100	95–100	95–100	90–95	0. 63–2. 0	0. 16–0. 18	4. 5–5. 0	Low	High.
90–95	80–90	80–90	75–85	0. 2–0. 63	0. 15–0. 17	<4. 5	Moderate	High.
70–80	70–80	65–75	50–70	2. 0–6. 3	0. 15–0. 17	4. 5–5. 0	Low	High.
55–65	50–60	40–50	40–50	2. 0–6. 3	0. 06–0. 12	4. 5–5. 0	Low	High.
95–100	95–100	90–100	80–95	0. 63–2. 0	0. 19–0. 21	4. 5–5. 0	Low	High.
95–100	95–100	90–100	85–95	0. 63–2. 0	0. 16–0. 18	4. 5–5. 0	Low	High.
100	100	95–100	85–95	0. 2–0. 63	0. 19–0. 21	6. 6–7. 3	Moderate	Low.
100	100	95–100	90–95	0. 2–0. 63	0. 16–0. 18	6. 6–7. 3	Moderate to high	Low.

[6] In Culleoka soils having slopes of 20 to 50 percent, the content of soft siltstone fragments larger than 3 inches is 10 to 25 percent, by volume.
[7] In Eden soils, the content of limestone fragments larger than 3 inches is 5 to 25 percent, by volume.
[8] In Weikert soils, the content of coarse fragments larger than 3 inches is 25 percent, by volume.
[9] In Woolper soils having slopes of 12 to 30 percent, the content of stones is 5 to 10 percent, by volume.

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TABLE 5.—*Engineering*

[Alluvial land, steep (AlF), Gullied land (Gu), Rock outcrop (in

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Beasley: BaB, BaC, BaD, BcC3, BcD3.	Poor: high clay content at a depth of more than 10 inches.	Poor: A–7; moderate shrink-swell potential; plastic.	Bedrock at a depth of 48 to 72 inches; some strongly sloping areas.	Excess seepage may occur when bedrock is exposed.
Berea: BeA, BeB, BeC	Fair: moderate clay content; bedrock at a depth of 20 to 40 inches.	Fair: A–6; moderate shrink-swell potential; plastic.	Seasonal high water table at a depth of 12 to 24 inches; bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches; seasonal high water table at a depth of 12 to 24 inches.
Blago: Bg	Good to a depth of 18 inches; seasonal high water table; poor at a depth of more than 18 inches; high clay content.	Poor: A–7; seasonal high water table; highly plastic; moderate shrink-swell potential.	Seasonal high water table at a depth of 0 to 6 inches.	Sites limited to dug ponds; seasonal high water table.
Boonesboro: Bo	Good to a depth of 24 inches; gravelly at a depth of more than 24 inches.	Fair: A–4 or A–6; bedrock at a depth of 20 to 40 inches.	Subject to flooding; bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches; flooding; highly pervious at a depth of more than 22 inches.
Brassfield: BrC, BrE, BrF	Fair: low organic matter; erodible.	Fair: A–4 to A–6; bedrock at a depth of 20 to 40 inches.	Most slopes are steep; bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches; may have seepage through underlying rock.
Caleast: CaB, CaC	Poor: high clay content below 8 inches.	Poor: A–7; moderate shrink-swell potential; medium to high compressibility.	Medium to high compressibility; moderate shrink-swell potential; bedrock at a depth of 42 to 84 inches.	Bedrock at a depth of 42 to 84 inches; subject to seepage.
Caneyville: CeF	Poor: clayey below 6 inches; bedrock at a depth of 20 to 40 inches; steep slopes; very stony.	Poor: A–7; plastic; moderate shrink-swell potential; very stony; steep slopes.	Bedrock at a depth of 20 to 40 inches; steep slopes; very stony.	Steep slopes: bedrock at a depth of 20 to 40 inches.
Captina: CnA, CnB, CnC, CnC3	Fair: seasonal high water table at a depth of 18 to 24 inches; moderate clay content.	Fair: A–4 or A–6; tight fragipan at a depth of 20 inches; plastic.	Seepage on pan; seasonal high water table at a depth of 18 to 24 inches.	Seasonal high water table at a depth of 18 to 24 inches; bedrock at a depth of 42 to 72 inches.

See footnotes at end of table.

interpretations

CyE, FaF, RoE), and Rock outcrop, shale (Rs), are not rated]

Soil features affecting—Continued					
Farm ponds—Con.: Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings
Moderate shrink-swell potential; clayey; fair to poor compaction; fair stability.	(1)	Few slopes more than 10 percent; slow permeability.	Few slopes more than 10 percent; clayey subsoil.	Slopes are 2 to 20 percent; clayey subsoil; erodible.	Moderate shrink-swell potential; slow permeability.
Fair stability; medium compressibility.	Slow permeability below a depth of 28 inches.	Slow permeability at a depth of more than 28 inches.	Bedrock at a depth of 20 to 40 inches.	Slopes are 0 to 12 percent; moderately well drained; bedrock at a depth of 20 to 40 inches.	Fair stability; moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches; seasonal high water table.
Fair stability; high compressibility; poor compaction; clayey; moderate shrink-swell potential.	Slow permeability; seasonal high water table at a depth of 0 to 6 inches; few outlets.	Slow permeability; poorly drained.	(1)	(1)	High compressibility; seasonal high water table; moderate shrink-swell potential.
Fair stability and compaction.	(1)	Flooding; bedrock at a depth of 20 to 40 inches.	Favorable for diversions; terraces not needed.	(1)	Subject to flooding; bedrock at a depth of 20 to 40 inches.
Fair to poor compaction; limited amount of material; fair stability.	(1)	Most slopes are more than 10 percent; low available moisture capacity.	Most slopes are more than 10 percent.	Slopes are 6 to 50 percent; erodible.	Bedrock at a depth of 20 to 40 inches.
Fair to poor stability and compaction; high to medium compressibility; moderate shrink-swell potential.	(1)	Moderately slow permeability.	Clayey subsoil; moderately slow permeability.	Slopes are 2 to 12 percent; clayey subsoil.	Medium to high compressibility; moderate shrink-swell potential.
Limited quantity; stony; medium to high compressibility; clayey.	(1)	Slopes are 35 to 60 percent; moderately slow permeability.	Slopes are 35 to 60 percent; very stony; clayey subsoil.	Slopes are 35 to 60 percent; clayey subsoil; bedrock at a depth of 20 to 40 inches.	Moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches; high compressibility; slopes are 35 to 60 percent.
Fair stability; medium to high compressibility.	Fragipan at a depth of 20 inches; slow permeability in fragipan.	Slowly permeable; fragipan at a depth of 20 inches.	Slowly permeable fragipan.	Slopes are 0 to 12 percent; moderately well drained; fragipan; erodible on sloping areas.	Seasonal high water table at a depth of 18 to 24 inches; medium to high compressibility.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Colyer: CoF; CsF3	Poor: bedrock at a depth of 8 to 20 inches; high shale content.	Poor: A-7 to A-2; bedrock at a shallow depth.	Slopes are steep; black shale at a depth of 8 to 20 inches.	Shale at a shallow depth.
Culleoka: CuB, CuC, CuD; CwE, CwF.	Fair: bedrock at a depth of 20 to 40 inches; steep slopes have 10 to 25 percent rock fragments.	Fair: A-6; bedrock at a depth of 20 to 40 inches.	Some slopes are steep; bedrock at a depth of 20 to 40 inches.	High seepage potential in bedrock; some steep slopes.
Cynthiana: CyE (Rock outcrop in this unit not rated.)	Poor: bedrock at a depth of 10 to 20 inches; high clay content.	Poor: A-7; bedrock at a depth of 10 to 20 inches; moderate to high shrink-swell potential; plastic.	Bedrock at a depth of 10 to 20 inches; moderately steep slopes; numerous rock outcrops.	High seepage potential in bedrock; bedrock at a depth of 10 to 20 inches.
Dunning: Du	Poor: seasonal high water table at a depth of 0 to 6 inches; clayey at a depth of more than 18 inches.	Poor: A-7; highly plastic; moderate to high shrink-swell potential.	Subject to flooding; seasonal water table at a depth of 0 to 6 inches.	Seasonal water table at a depth of 0 to 6 inches; sites limited to dug ponds.
Eden: EdD2; EeE2, EeF2	Poor: high clay content; 5 to 25 percent rock fragments.	Poor: A-7; high clay content; highly plastic; poor stability.	Slopes are steep; subject to slides.	Possible seepage in bedrock; steep topography.
Egam: Eg	Fair: moderate clay content.	Poor: A-7; moderate shrink-swell potential; plastic.	Subject to flooding; moderate shrink-swell potential.	Sites limited to dug ponds; flooding hazard.
Elk: ElA, ElB, ElC, ElD	Good to a depth of 10 inches; fair at a depth of more than 10 inches; moderate clay content.	Fair: A-4	(2)	(2)
Fairmount: FaF (Rock outcrop in this unit not rated.)	Poor: clayey; bedrock at a depth of 10 to 20 inches.	Poor: A-7; plastic; bedrock at a shallow depth.	Slopes are steep; bedrock at a depth of 10 to 20 inches; numerous rock outcrops.	Slopes are steep; bedrock at a shallow depth; subject to seepage.
Faywood: FdC, FdE	Poor: high clay content.	Poor: A-7; plastic; bedrock at a depth of 20 to 40 inches; moderate shrink-swell potential.	Bedrock at a depth of 20 to 40 inches; slopes are sloping to moderately steep.	Bedrock at a depth of 20 to 40 inches; seepage hazard.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings
Limited amount of material; poor to fair stability and compaction.	(1)	Shallow; low available moisture capacity; slopes are 12 to 50 percent.	Shale at a shallow depth; slopes are 12 to 50 percent.	Steep slopes; erodible; shale at a shallow depth.	Shale at a depth of 8 to 20 inches; medium to high compressibility.
Fair stability; medium compressibility.	(1)	Most slopes are more than 10 percent.	Most slopes are more than 10 percent; bedrock at a depth of 20 to 40 inches.	Slopes are 2 to 50 percent; bedrock at a depth of 20 to 40 inches; erodible on steep slopes.	Bedrock at a depth of 20 to 40 inches; medium compressibility.
Poor compaction; clayey; limited amount of material; rock outcrops; high compressibility.	(1)	All slopes are more than 10 percent; shallow.	All slopes are more than 10 percent; shallow; clayey subsoil.	Slopes are 12 to 30 percent; rock outcrops; shallow; erodible.	High compressibility; bedrock at a depth of 10 to 20 inches; moderate to high shrink-swell potential.
Fair stability; high compressibility; poor compaction.	Slow permeability; poorly drained; flooding; seasonal high water table at a depth of 0 to 6 inches.	Slow permeability; poorly drained.	Clayey; slow permeability; subject to flooding.	(1)	High compressibility; subject to flooding; seasonal high water table at a depth of 0 to 6 inches; moderate to high shrink-swell potential.
Moderate to high shrink-swell potential; poor compaction; high compressibility; flaggy.	(1)	Most slopes are more than 10 percent; slow permeability.	Most slopes are more than 10 percent; clayey subsoil.	Slopes are 6 to 50 percent; clayey; erodible.	Moderate to high shrink-swell potential; high compressibility.
Fair compaction; medium to high compressibility; moderate shrink-swell potential.	Slow permeability; seasonal high water table at a depth of 24 to 36 inches; flooding.	Slow permeability; flooding.	Flooding; slow permeability.	(1)	Moderate shrink-swell potential; medium to high compressibility.
Fair compaction; medium compressibility.	(1)	Some slopes are more than 10 percent.	Some slopes are more than 10 percent.	Slopes are 0 to 20 percent; erodible on steep slopes.	Medium compressibility.
Limited amount of material; poor compaction; moderate to high shrink-swell potential; clayey.	(1)	Slopes are more than 10 percent; bedrock at a shallow depth.	Slopes are steep; moderately slow permeability.	Slopes are 30 to 60 percent; clayey subsoil; rock outcrops.	Bedrock at a depth of 10 to 20 inches; high compressibility; moderate to high shrink-swell potential.
Poor compaction; high compressibility; moderate shrink-swell potential.	(1)	Some slopes are more than 10 percent; moderately slow permeability.	Some slopes are more than 10 percent; bedrock at a depth of 20 to 40 inches; clayey subsoil.	Slopes are 6 to 30 percent; clayey subsoil; bedrock at a depth of 20 to 40 inches; erodible on steep slopes.	High compressibility; moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Hagerstown: HaB, HaC	Good to a depth of 10 inches; high clay content at a depth of more than 10 inches.	Poor: A–7; plastic; moderate shrink-swell potential.	(2)	High seepage potential in bedrock.
Huntington: Hu	Good	Fair: A–4 or A–6; medium compressibility.	Subject to flooding	Pervious material; subject to flooding.
Kickapoo: Kp	Good	Good to fair: A–4 to A–2.	Subject to flooding	Pervious material; subject to flooding.
Lawrence: Lc	Fair: seasonal high water table.	Poor: A–6 or A–7; seasonal high water table at a depth of 6 to 18 inches; medium compressibility.	Seasonal high water table at a depth of 6 to 18 inches.	Sites limited to dug ponds; seasonal high water table.
Lindside: Ld	Good	Fair: A–4 or A–6; seasonal high water table at a depth of 24 to 36 inches; medium compressibility.	Subject to flooding; seasonal high water table at a depth of 24 to 36 inches.	Flood hazard; pervious material.
Lowell: LwB, LwC, LwD; LyE3	Good to a depth of 8 inches; high clay content at a depth of more than 8 inches.	Poor: A–7; highly plastic; moderate shrink-swell potential; medium to high compressibility.	Bedrock at a depth of 42 to 84 inches; some slopes are strongly sloping to moderately steep.	High seepage potential in bedrock.
McAfee: MnC, MnD	Poor: high clay content at a depth of more than 7 inches; bedrock at a depth of 20 to 40 inches.	Poor: A–7; highly plastic; bedrock at a depth of 20 to 40 inches; moderate shrink-swell potential; high compressibility.	Bedrock at a depth of 20 to 40 inches; some slopes are strongly sloping.	High seepage potential in bedrock; bedrock at a depth of 20 to 40 inches.
Melvin: Mt	Poor: seasonal high water table at a depth of 0 to 6 inches.	Fair: A–4 or A–6; seasonal high water table at a depth of 0 to 6 inches; medium compressibility.	Subject to flooding; seasonal high water table at a depth of 0 to 6 inches.	Sites limited to dug ponds; moderately pervious material; flooding.
Mercer: MuA, MuB, MuC; MvC3	Fair to a depth of 22 inches; moderate clay content.	Poor: A–6 or A–7; moderate shrink-swell potential; medium compressibility.	Seasonal high water table at a depth of 18 to 24 inches.	Subject to seepage through bedrock.
Monongahela: MwA, MwB, MwC.	Good to a depth of 20 inches.	Fair: A–4 or A–6; medium compressibility.	Seasonal high water table at a depth of 18 to 24 inches.	(2)

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings
Fair to poor compaction; medium to high compressibility; moderate shrink-swell potential.	(1)	(2)	(2)	Slopes are 2 to 12 percent; erodible on sloping areas.	Moderate shrink-swell potential; high compressibility.
Fair stability and compaction; piping hazard.	(1)	Flooding	Flooding	(1)	Medium compressibility.
Moderate permeability; possible piping hazard.	(1)	Flooding; moderately rapid permeability.	Floodplain position; possible siltation.	(1)	Subject to flooding.
Fair stability and compaction.	Slowly permeable subsoil; fragipan at a depth of 18 inches; few outlets.	Slowly permeable fragipan; somewhat poorly drained.	Somewhat poorly drained; seasonal high water table.	Nearly level; somewhat poorly drained; fragipan.	Medium compressibility; seasonal high water table; fair stability.
Fair stability; hazard of piping; medium compressibility.	Flooding; seasonal high water table at a depth of 24 to 36 inches.	Flooding	Flooding	(1)	Subject to flooding; seasonal high water table at a depth of 24 to 36 inches; medium compressibility.
Fair to poor stability and compaction; high to medium compressibility; moderate shrink-swell potential; clayey.	(1)	Some slopes are more than 10 percent; moderately slow permeability.	Some slopes are more than 10 percent; clayey subsoil.	Some slopes are steep; high clay content in subsoil; erodible on steep slopes.	Moderate shrink-swell potential; medium to high compressibility.
Poor compaction; high compressibility; moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches.	(1)	Some slopes are more than 10 percent; moderately slow permeability.	Some slopes are more than 10 percent; clayey subsoil; bedrock at a depth of 20 to 40 inches.	Slopes are 6 to 20 percent; high clay clay content in subsoil; bedrock at a depth of 20 to 40 inches; erodible on steep slopes.	Bedrock at a depth of 20 to 40 inches; moderate shrink-swell potential; high compressibility.
Fair compaction and stability; hazard of piping; medium compressibility.	Seasonal high water table at a depth of 0 to 6 inches; flooding.	Flooding; poorly drained.	Floodplain position; poorly drained.	(1)	Subject to flooding; seasonal high water table at a depth of 0 to 6 inches; medium compressibility.
Fair stability and compaction; moderate shrink-swell potential.	Slowly permeable fragipan at a depth of 22 inches.	Slowly permeable fragipan at a depth of 22 inches.	(2)	Erodible on sloping areas; slopes; seasonal high water table; seepy areas; moderately well drained; fragipan.	Seasonal high water table; medium to high compressibility.
Fair stability and compaction; medium compressibility.	Slowly permeable fragipan at a depth of 20 inches.	Slowly permeable fragipan at a depth of 20 inches.	(2)	Seasonal high water table; erodible on sloping areas; few seepy areas; moderately well drained; fragipan.	Seasonal high water table; medium compressibility.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Newark: Ne	Good: seasonal high water table at a depth of 6 to 18 inches.	Fair: A–6; seasonal high water table; medium compressibility.	Subject to flooding; seasonal high water table at a depth of 6 to 18 inches.	Flooding; sites limited to dug ponds; moderate permeability; seasonal high water table.
Nicholson: NhB, NhC	Fair at a depth of more than 7 inches; moderate clay content.	Poor: A–6; medium to high compressibility; moderate shrink-swell potential.	Seasonal high water table at a depth of 24 to 36 inches for short periods.	Subject to solution channels in bedrock.
Opequon (Rock outcrop in this unit not rated.)	Poor: high clay content; bedrock at a depth of 10 to 20 inches.	Poor: A–7; plastic; bedrock at a shallow depth.	Slopes are strongly sloping to moderately steep; numerous rock outcropping; bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches; subject to seepage.
Otway: OtC, OtE, OtF	Poor: high clay content.	Poor: A–7; plastic; moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches; subject to slides.	Bedrock at a depth of 20 to 40 inches; slopes are moderately steep and steep; subject to slides.	Seepage may occur when bedrock is exposed; bedrock at a depth of 20 to 40 inches.
Rarden: RaC, RaD2	Poor: high clay content at a depth of more than 9 inches.	Poor: A–7; plastic; high shrink-swell potential.	Bedrock at a depth of 20 to 40 inches; some slopes are strongly sloping.	Bedrock at a depth of 20 to 40 inches.
Robertsville: Rb	Fair to a depth of 15 inches; seasonal high water table at a depth of 0 to 6 inches.	Poor: A–6 or A–7; seasonal high water table at a depth of 0 to 6 inches; tight fragipan at a depth of 15 inches; medium compressibility.	Seasonal high water table at a depth of 0 to 6 inches.	Sites limited to dug ponds; flat topography.
Rockcastle: RcC, RcD, RcE	Poor: clayey at a depth of more than 5 inches; shale at a depth of 20 to 40 inches.	Poor: A–7; bedrock at a depth of 20 to 40 inches; plastic; medium to high compressibility; moderate shrink-swell potential.	Subject to slides; some slopes are moderately steep; bedrock at a depth of 20 to 40 inches.	Most slopes are strongly sloping to moderately steep; bedrock at a depth of 20 to 40 inches.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings
Fair stability and compaction; slight hazard of piping; medium compressibility.	Seasonal high water table at a depth of 6 to 18 inches; flooding.	Somewhat poorly drained; flooding.	Floodplain position; somewhat poorly drained.	(1)	Subject to flooding; seasonal high water table; medium compressibility.
Medium to high compressibility.	(1)	(2)	(2)	Erodible on steeply sloping areas.	Medium compressibility; seasonal high water table at a depth of 24 to 36 inches for short periods; fair stability; moderate shrink-swell potential.
Poor compaction; limited soil material; rock outcrop; medium to high compressibility.	(1)	Slopes are 12 to 30 percent; bedrock at a shallow depth; rock outcrop.	Slopes are 12 to 30 percent; bedrock at a shallow depth; rock outcrop.	Slopes are 12 to 30 percent; bedrock at a shallow depth; erodible; clayey subsoil.	Bedrock at a depth of 10 to 20 inches; moderate shrink-swell potential; high compressibility.
Moderate shrink-swell potential; clayey; poor stability; medium to high compressibility.	(1)	Most slopes are more than 10 percent; slow permeability.	Most slopes are more than 10 percent; clayey.	Slopes are 6 to 50 percent; clayey; erodible.	Bedrock at a depth of 20 to 40 inches; moderate shrink-swell potential.
Moderate to high shrink-swell potential; medium to high compressibility; fair stability.	(1)	Some slopes are more than 10 percent; slow permeability.	Some slopes are more than 10 percent; clayey subsoil; bedrock at a depth of 20 to 40 inches.	Clayey subsoil; erodible on steep slopes.	Bedrock at a depth of 20 to 40 inches; moderate to high shrink-swell potential; poor stability; medium to high compressibility.
Fair stability and compaction; medium compressibility.	Slowly permeable fragipan at a depth of 15 inches; seasonal high water table at a depth of 0 to 6 inches; few outlets.	Slowly permeable fragipan at a depth of 15 inches; poorly drained; seasonal high water table.	Nearly level	(1)	Seasonal high water table at a depth of 0 to 6 inches; medium compressibility; slow permeability.
Fair to poor compaction; moderate shrink-swell potential; medium to high compressibility; fair stability; clayey.	(1)	(1)	(1)	Slopes are 6 to 30 percent; low fertility; erodible on steep slopes; clayey subsoil.	Subject to slides; moderate shrink-swell potential; medium to high compressibility; bedrock at a depth of 20 to 40 inches.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—	
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir area
Shelbyville: ShA, ShB, ShC	Fair to a depth of 30 inches; moderate clay content; poor at a depth of more than 30 inches; high clay content.	Poor: A–6 or A–7; plastic; moderate shrink-swell potential; medium compressibility.	(2)	Subject to solution channels in bedrock.
Shelocta: SlD	Poor: many rock fragments; low fertility.	Fair: A–4 or A–2; poor to fair stability.	Slopes are strongly sloping to moderately steep; shale at a depth of 36 to 72 inches.	Slopes are strongly sloping to moderately steep.
Shrouts: SrC, SrE; SuE3	Poor: clayey	Poor: A–7; highly plastic; high shrink-swell potential.	Subject to slides; most slopes are strongly sloping to moderately steep.	Most slopes are strongly sloping to moderately steep.
Tate: TaB, TaC, TaD2	Good	Fair: A–4 or A–6; plastic.	(2)	Pervious material at a depth of more than 36 inches.
Trappist: TrB, TrC, TrD; TsC3	Fair: moderate clay content at a depth of more than 6 inches.	Poor: A–7 to A–6; plastic; shale at a depth of 20 to 40 inches; moderate shrink-swell potential; medium to high compressibility.	Shale at a depth of 20 to 40 inches; some slopes are strongly sloping.	Bedrock at a depth of 20 to 40 inches.
Weikert: WeG	Poor: low fertility; many rock fragments; bedrock at a depth of 10 to 20 inches.	Poor: bedrock at a depth of 10 to 20 inches; slopes are very steep.	Slopes are very steep; bedrock at a depth of 10 to 20 inches.	Slopes are very steep; bedrock at a depth of 10 to 20 inches; pervious material.
Whitley: WhB, WhC, WhD	Good	Fair: A–6; medium compressibility; plastic.	(2)	Moderately pervious material.
Woolper: WoB, WoC; WpE	Fair: high clay content at a depth of more than 8 inches; moderately steep areas are stony.	Poor: A–7; moderate to high shrink-swell potential; plastic; medium to high compressibility.	Some slopes are moderately steep; clayey subsoil.	(2)

[1] Not applicable or not needed.

interpretations—Continued

Soil features affecting—Continued					
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings
Medium compressibility; fair stability and compaction; moderate shrink-swell potential.	(1)	(2)	(2)	Slopes are 0 to 12 percent; erodible on sloping areas.	Moderate shrink-swell potential; medium compressibility.
Fair stability; moderate permeability.	(1)	(1)	All slopes are more than 10 percent.	Slopes are 12 to 25 percent; gravelly; erodible.	Fair stability.
Poor stability; clayey; high shrink-swell potential; high compressibility.	(1)	(1)	Most slopes are more than 10 percent; clayey.	Slopes are 6 to 30 percent; clayey; erodible.	High compressibility; high shrink-swell potential; subject to slides.
Fair stability; some hazard of piping.	(1)	Some slopes are more than 10 percent.	Some slopes are more than 10 percent.	Slopes are 2 to 20 percent; erodible where sloping or steeper.	(2).
Fair stability and compaction; medium to high compressibility.	(1)	Some slopes are more than 10 percent; moderately slow permeability.	Some slopes are more than 10 percent; bedrock at a depth of 20 to 40 inches.	Slopes are 2 to 20 percent; erodible where sloping or steeper; shale at a depth of 20 to 40 inches.	Moderate shrink-swell potential; shale at a depth of 20 to 40 inches; medium to high compressibility.
Bedrock at a depth of 10 to 20 inches; moderate permeability; hazard of piping.	(1)	(1)	Slopes are 40 to 80 percent; bedrock at a depth of 10 to 20 inches.	Slopes are 40 to 80 percent; bedrock at a depth of 10 to 20 inches.	Bedrock at a depth of 10 to 20 inches.
Fair stability and compaction; medium compressibility.	(1)	Some slopes are more than 10 percent.	Slopes are 2 to 20 percent.	Slopes are 2 to 20 percent; erodible where sloping or steeper.	Medium compressibility.
Fair to poor compaction; moderate to high shrink-swell potential; fair stability; medium to high compressibility.	(1)	Some slopes are more than 10 percent; clayey subsoil; moderately slow permeability.	Slopes are 2 to 30 percent; clayey subsoil.	Slopes are 2 to 30 percent; clayey subsoil; erodible on steep slopes.	Medium to high compressibility; moderate to high shrink-swell potential; seepage spots.

[2] All factors favorable.

Some of the properties shown in the table need no explanation. Others are defined in the Glossary or explained as follows:

Seasonal high water table refers to free water that collects in the soil profile during the seasons of highest rainfall, either as perched water that is separated from the ground water by a nearly impervious soil layer or as a part of the ground water.

USDA texture (*16*) is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and some of the other terms used in the USDA textural classification are defined in the Glossary of this soil survey.

Permeability, as used in table 4, relates only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from use of the soils are not considered.

Available moisture capacity is the capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is expressed in table 4 as inches of water per inch of soil.

Reaction is the degree of acidity or alkalinity of a soil, expressed as pH value. The pH value and relative terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential indicates the volume change to be expected when the moisture content of soil material changes. The shrinking and swelling of soils greatly damage building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with soil materials.

Corrosivity, as used here, indicates the potential danger to concrete structures through chemical action that dissolves or weakens the structural material. Structural material may corrode when buried in soil, and a given material corrodes in some kinds of soil more rapidly than in others. Extensive installations that intersect soil boundaries or soil horizons are more likely to be damaged by corrosion than are installations entirely in one kind of soil or soil horizon.

Interpretations of engineering properties of soils

Table 5 rates the soils of Madison County according to their suitability and limiting features for several uses related to engineering. Detrimental or undesirable features are emphasized. The ratings and other interpretations in this table are based on estimated engineering properties of the soils given in table 4, on available test data, and on field experience.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily rich in organic matter, used as a topdressing for lawns, gardens, roadbanks, and the like. The ratings indicate suitability for such use.

Road fill is a material used to build embankments. The ratings indicate performance of soil material moved from borrow areas for this purpose.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. These soil features are the principal ones that affect geographic location of the highways.

Farm pond reservoir areas are affected by features of the soil that mainly contribute to loss of water by seepage.

Farm pond embankments serve as dams. The features of disturbed soil from both the subsoil and substratum greatly influence the construction of embankments.

Agricultural drainage is influenced by features of the undisturbed soil that affect the installation and performance of surface and subsurface drainage installations.

Irrigation is affected by features of undisturbed soil that influence soil-moisture relations and the potential of a soil to produce specific crops. Before planning an irrigation project, a feasibility study made by a qualified consultant is desirable.

Terraces and diversions are affected by soil features that influence their stability or hinder layout and construction. Also, diversions are affected by hazards of sedimentation in channels and the difficulty of establishing and maintaining cover.

Grassed waterways are affected by soil features that influence the establishment and maintenance of plant growth or affect layout and construction (fig. 11).

Foundations for low buildings are affected chiefly by features of the undisturbed soil that influence the capacity to support low buildings having normal foundation loads.

There are no known sources of sand or gravel in the survey area suitable for use in construction. If there are any suitable deposits, they most likely underlie some of the soils of the flood plains of the Kentucky River and its main tributaries.

Use of Soils for Town and Country Planning

Soils are an important consideration in planning town and country uses of land. The interpretations in this section point out soil-related limitations and problems expected to be encountered in such uses. The most severe limitations listed may be overcome if the cost involved can be justified. The information is not intended to eliminate the need of onsite investigations for specific uses, but serves as a guide for screening sites and for planning more detailed investigations.

Table 6 shows the estimated degree of limitation and kinds of limitations for selected town and country uses of the soils. A rating of *slight* indicates that limitations, if any, are of minor consequence and are easy to overcome. A rating of *moderate* indicates that limitations are of a magnitude that requires careful planning, design, and management. Cost of corrective measures is an important consideration. A rating of *severe* indicates that limitations are severe enough that cost of corrective measures may be too high to justify the use.

The kinds of limitations, expressed in terms of soil characteristics or properties, are shown only for the moderate and severe ratings. Some of the terms may not be found in a standard dictionary or may have a special meaning. These are defined in the Glossary in the back of this survey.

The criteria used to rate the soils vary somewhat among the different town and country related uses. The ratings in table 6 are based on the following factors:

Septic tank filter fields.—The ratings for this use are based on soil permeability, depth to seasonal water table, depth to bedrock, surface rockiness and stoniness, slope, and hazard of flooding. Possible pollution hazards to a water supply source are not a consideration here, but they would be a severe limitation.

***Figure 11.*—Grassed waterway constructed across a field on Shelbyville silt loam, 0 to 2 percent slopes.**

Sewage lagoons.—These are shallow ponds that are used for disposal of sewage by oxidation. The ratings for this use are based on permeability (basin floor), slope, depth to bedrock, quantity of coarse fragments (less than 10 inches in diameter), surface stoniness, kind of soil material at site, hazard of flooding, and content of organic matter in the soil.

Building locations.—This use includes dwellings and service buildings limited to three stories or less and with basements. The ratings are based on depth to seasonal water table, depth to bedrock, slope, surface rockiness and stoniness, hazard of flooding, frost action, and shrink-swell potential. Slope is more restrictive for subdivision locations than for other areas.

Campsites (tents and trailers).—The ratings for this intensive use are based on depth to bedrock, permeability, depth to seasonal water table, surface rockiness and stoniness, texture of surface layer, and hazard of flooding. Slope is more restrictive for trailer parks than for tent areas.

County and access roads.—The ratings are for normal hard-surface roads used by traffic in the county, including traffic in small towns. The ratings are based on depth to seasonal water table, slope, depth to rock, surface rockiness and stoniness, hazard of flooding, and shrink-swell potential.

Streets and parking lots in subdivisions.—The ratings for this use are based on depths to seasonal water table, slope, depth to rocks, surface rockiness and stoniness, hazard of flooding, shrink-swell potential. Slope is a more restrictive factor for parking lots and streets than for county and access roads.

Athletic fields.—The rating for this intensive use are for sports such as baseball, football, and volley ball, that normally require a nearly level finished area and are subject to heavy foot traffic. The ratings are based on depth to seasonal water table, soil permeability, slope, depth to bedrock, surface rockiness and stoniness, texture of the surface layer, and hazard of flooding.

Play and picnic areas.—These areas are subject to less intensive use than athletic fields. The ratings are based on depth to seasonal water table, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and hazard of flooding. These factors are less restrictive for play areas and picnic areas than for athletic fields.

TABLE 6.—*Limitations of soils*

[Gullied land (Gu), Rock outcrop (in CyE, FaF, RoE),

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Alluvial land, steep: AlF.	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.
Beasley:						
BaB	Severe: slow permeability.	Moderate: gently sloping.	Moderate: moderate to high shrink-swell potential.	Moderate: slow permeability.	Moderate: slow permeability; gently sloping.	Moderate: moderate to high shrink-swell potential.
BaC	Severe: slow permeability.	Severe: sloping	Moderate: moderate to high shrink-swell potential; sloping.	Moderate: slow permeability; sloping.	Severe: sloping	Moderate: moderate to high shrink-swell potential.
BaD	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; moderate to high shrink-swell potential.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; moderate to high shrink-swell potential.
BcC3	Severe: slow permeability.	Severe: sloping	Moderate: moderate to high shrink-swell potential; sloping.	Moderate: silty clay loam surface layer; slow permeability; sloping.	Severe: silty clay loam surface layer; sloping.	Moderate: moderate to high shrink-swell potential.
BcD3	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; moderate to high shrink-swell potential.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; moderate to high shrink-swell potential.
Berea:						
BeA	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; slow permeability; seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability.	Moderate: slow permeability.	Severe: seasonal high water table at a depth of 18 to 24 inches; bedrock at a depth of 20 to 40 inches.
BeB	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches; gently sloping.	Severe: bedrock at a depth of 20 to 40 inches; slow permeability; seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability.	Moderate: slow permeability; gently sloping.	Severe: bedrock at a depth of 20 to 40 inches; seasonal high water table at a depth of 18 to 24 inches.
BeC	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: bedrock at a depth of 20 to 40 inches; slow permeability; seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability.	Severe: sloping; slow permeability.	Severe: bedrock at a depth of 20 to 40 inches; seasonal high water table; sloping.

for town and country planning

and Rock outcrop, shale (Rs), are not rated]

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Severe: slopes more than 12 percent.	Severe: flood hazard.	Moderate to severe: 12 to 40 percent slopes.
Moderate: moderate to high shrink-swell potential; gently sloping.	Moderate: gently sloping.	Slight	Slight	Severe: bedrock at a depth of 48 to 72 inches.	Severe: slow permeability.	Slight.
Severe: moderate to high shrink-swell potential; sloping.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 48 to 72 inches.	Severe: slow permeability; sloping.	Slight.
Severe: strongly sloping; moderate to high shrink-swell potential.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 48 to 72 inches; slopes over 12 percent.	Severe: strongly sloping; slow permeability.	Moderate: strongly sloping.
Severe: moderate to high shrink-swell potential; sloping.	Severe: silty clay loam surface layer; sloping.	Moderate: silty clay loam surface layer; sloping.	Moderate: silty clay loam surface layer; past erosion; sloping.	Severe: bedrock at a depth of 48 to 72 inches.	Severe: slow permeability.	Moderate: silty clay loam surface layer.
Severe: strongly sloping; moderate to high shrink-swell potential.	Severe: strongly sloping; silty clay loam surface layer.	Severe: strongly sloping.	Severe: strongly sloping; silty clay loam surface layer.	Severe: bedrock at a depth of 48 to 72 inches; slopes over 12 percent.	Severe: strongly sloping; slow permeability.	Moderate: silty clay loam surface layer; strongly sloping.
Severe: seasonal high water table at a depth of 18 to 24 inches; bedrock at a depth of 20 to 40 inches.	Moderate: slow permeability; bedrock at a depth of 20 to 40 inches.	Slight	Slight	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Slight.
Severe: bedrock at a depth of 20 to 40 inches; seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; bedrock at a depth of 20 to 40 inches.	Slight	Slight	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Slight.
Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: sloping; slow permeability; bedrock at a depth of 20 to 40 inches.	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Slight.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Blago: Bg	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches.	Slight	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches; slow permeability.	Severe: seasonal high water table at a depth of 0 to 6 inches; slow permeability.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Boonesboro: Bo.	Severe: bedrock at a depth of 20 to 40 inches; flood hazard.	Severe: moderately rapid permeability; bedrock at a depth of 20 to 40 inches; flood hazard.	Severe: bedrock at a depth of 20 to 40 inches; flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: bedrock at a depth of 20 to 40 inches.
Brassfield:						
BrC	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: sloping.	Severe: sloping.	Severe: bedrock at a depth of 20 to 40 inches; sloping.
BrE	Severe: bedrock at a depth of 20 to 40 inches; moderately steep.	Severe: bedrock at a depth of 20 to 40 inches; moderately steep.	Severe: bedrock at a depth of 20 to 40 inches; moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep; bedrock at a depth of 20 to 40 inches.
BrF	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: steep	Severe: steep	Severe: steep
Caleast:						
CaB	Severe: slow permeability.	Moderate: gently sloping.	Moderate: moderate to high shrink-swell potential; bedrock at a depth of 42 to 84 inches.	Moderate: slow permeability.	Moderate: slow permeability; gently sloping.	Moderate: moderate to high shrink-swell potential.
CaC	Severe: slow permeability.	Severe: sloping	Moderate: moderate to high shrink-swell potential; sloping.	Moderate: slow permeability; sloping.	Severe: sloping	Moderate: moderate to high shrink-swell potential; sloping.
Caneyville: CeF.	Severe: bedrock at a depth of 20 to 40 inches; moderately slow permeability; steep; stony.	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: bedrock at a depth of 20 to 40 inches; steep; stony.	Severe: steep	Severe: steep	Severe: bedrock at a depth of 20 to 40 inches; steep.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches; slow permeability.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of less than 24 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches; slow permeability.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Slight	Slight	Severe: bedrock at a depth of 20 to 40 inches.	Severe: flood hazard.	Slight.
Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: sloping.	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Slight.
Severe: moderately steep; bedrock at a depth of 20 to 40 inches.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: moderately steep; bedrock at a depth of 20 to 40 inches.	Severe: moderately steep.
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: steep.
Moderate: moderate to high shrink-swell potential; gently sloping.	Moderate: gently sloping.	Slight	Slight	Severe: bedrock at a depth of 42 to 84 inches; fine texture.	Severe: slow permeability.	Slight.
Severe: moderate to high shrink-swell potential; sloping.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 42 to 84 inches; fine texture.	Severe: slow permeability; sloping.	Slight.
Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: steep	Severe: steep	Severe: bedrock at a depth of 20 to 40 inches; slopes more than 12 percent.	Severe: bedrock at a depth of 20 to 40 inches; steep.	Severe: steep.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Captina:						
CnA	Severe: slow permeability; fragipan.	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches.
CnB	Severe: slow permeability; fragipan.	Moderate: gently sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches.
CnC	Severe: slow permeability; fragipan.	Severe: sloping	Moderate: seasonal high water table at a depth of 18 to 24 inches; sloping.	Moderate: slow permeability; fragipan.	Severe: sloping; slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches; sloping.
CnC3	Severe: slow permeability; fragipan.	Severe: sloping	Moderate: seasonal high water table at a depth of 18 to 24 inches; sloping.	Moderate: slow permeability; fragipan.	Severe: sloping; slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches; sloping.
Colyer: CoF, CsF3.	Severe: bedrock at a depth of 8 to 20 inches; steep.	Severe: bedrock at a depth of 8 to 20 inches; steep.	Severe: steep	Severe: steep	Severe: steep	Severe: steep
Culleoka:						
CuB	Severe: bedrock at a depth of 20 to 40 inches.	Severe: moderate permeability; bedrock at a depth of 20 to 40 inches; gently sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Slight	Moderate: gently sloping.	Severe: bedrock at a depth of 20 to 40 inches.
CuC	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: moderate permeability; bedrock at a depth of 20 to 40 inches; sloping.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: sloping.	Severe: sloping.	Severe: bedrock at a depth of 20 to 40 inches.
CuD	Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.
CwE, CwF	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep
Cynthiana (Cynthiana part of CyE.)	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Slight	Slight	Severe: bedrock at a depth of 42 to 72 inches.	Severe: slow permeability; fragipan.	Slight.
Moderate: seasonal high water table at a depth of 18 to 24 inches; gently sloping.	Moderate: slow permeability; fragipan.	Slight	Slight	Severe: bedrock at a depth of 42 to 72 inches.	Severe: slow permeability; fragipan.	Slight.
Severe: sloping	Severe: sloping; slow permeability; fragipan.	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 42 to 72 inches.	Severe: slow permeability; fragipan.	Slight.
Severe: sloping	Severe: sloping; slow permeability; fragipan.	Moderate: sloping.	Moderate: sloping; past erosion.	Severe: bedrock at a depth of 42 to 72 inches.	Severe: slow permeability; fragipan.	Slight.
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: bedrock at a depth of 6 to 18 inches.	Severe: steep	Severe: coarse fragments; steep.
Severe: bedrock at a depth of 20 to 40 inches.	Moderate: gently sloping.	Slight	Slight	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Slight.
Severe: bedrock at a depth of 20 to 40 inches.	Severe: sloping.	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: sloping; bedrock at a depth of 20 to 40 inches.	Slight.
Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.	Moderate: strongly sloping.
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: bedrock at a depth of 20 to 40 inches.	Severe: steep	Severe: steep.
Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Dunning: Du	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches; flood hazard.	Severe: flood hazard.	Severe: seasonal high water table at a depth of 0 to 6 inches; flood hazard.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Eden:						
EdD2	Severe: slow permeability.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.
EeE2, EeF2	Severe: slow permeability; steep.	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep
Egam: Eg	Severe: slow permeability; flood hazard.	Severe: flood hazard.	Severe: flood hazard; frost action.	Moderate: slow permeability; flood hazard; silty clay loam surface layer; seasonal high water table at a depth of 24 to 36 inches.	Moderate: slow permeability; flood hazard; silty clay loam surface layer; seasonal high water table at a depth of 24 to 36 inches.	Moderate: seasonal high water table at a depth of 24 to 36 inches; frost action.
Elk:						
ElA	Slight	Moderate: moderate permeability.	Slight	Slight	Slight	Slight
ElB	Slight	Moderate: moderate permeability; gently sloping.	Slight	Slight	Moderate: gently sloping.	Slight
ElC	Moderate: sloping.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: sloping	Moderate: sloping.
ElD	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.
Fairmount (Fairmount part of FaF.)	Severe: slow permeability; bedrock at a depth of 10 to 20 inches; rock outcrops; steep.	Severe: bedrock at a depth of 10 to 20 inches; steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; steep.	Severe: steep	Severe: steep	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; steep.
Faywood:						
FdC	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: moderately slow permeability; sloping.	Severe: sloping	Severe: bedrock at a depth of 20 to 40 inches.
FdE	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches; moderately steep.	Severe: bedrock at a depth of 20 to 40 inches; moderately steep.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: moderately steep.	Severe: moderately steep.	Severe: bedrock at a depth of 20 to 40 inches; moderately steep.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: seasonal high water table at a depth of 0 to 6 inches; flood hazard.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at at depth of 0 to 6 inches; flood hazard.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; silty clay surface layer.	Severe: slopes more than 12 percent.	Severe: slow permeability; strongly sloping.	Moderate: silty clay surface layer; strongly sloping.
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: slopes more than 12 percent.	Severe: slow permeability; steep.	Severe: steep.
Moderate: seasonal high water table at a depth of 24 to 36 inches; frost action.	Moderate: slow permeability; seasonal high water table at a depth of 24 to 36 inches; silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Severe: subject to flooding.	Moderate: slow permeability; seasonal high water table; flood hazard; clayey surface.	Severe: silty clay loam surface layer; slow permeability.
Slight	Slight	Slight	Slight	Slight	Slight	Slight.
Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Slight	Slight	Slight.
Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: 6 to 12 percent slopes.	Moderate: sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: slopes over 12 perpercent.	Severe: strongly sloping.	Moderate: strongly sloping.
Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; steep.	Severe: bedrock at a depth of 10 to 20 inches; steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; steep.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; steep.	Severe: steep.
Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: sloping; bedrock at a depth of 20 to 40 inches.	Moderate: sloping; bedrock at a depth of 20 to 40 inches.	Moderate: sloping; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Slight.
Severe: bedrock at a depth of 20 to 40 inches; moderately steep.	Severe: moderately steep; bedrock at a depth of 20 to 40 inches.	Severe: moderately steep.	Severe: moderately steep.	Severe: slopes over 12 percent.	Severe: bedrock at a depth of 20 to 40 inches; moderately steep.	Moderate: moderately steep.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Hagerstown:						
HaB	Moderate: moderately slow permeability.	Moderate: unfavorable permeability; gently sloping.	Moderate: moderate shrink-swell potential.	Slight	Moderate: gently sloping.	Slight
HaC	Moderate: moderately slow permeability; slope.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: sloping	Moderate: sloping.
Huntington: Hu	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Slight
Kickapoo: Kp	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard.	Moderate: flood hazard.	Severe: flood hazard.
Lawrence: Lc	Severe: slow permeability; seasonal high water table; at a depth of 6 to 18 inches; fragipan.	Slight	Severe: seasonal high water table at a depth of 6 to 18 inches; frost action.	Severe: slow permeability; seasonal high water table at a depth of 6 to 18 inches; fragipan.	Severe: slow permeability; seasonal high water table at a depth of 6 to 18 inches; fragipan.	Moderate: seasonal high water table at a depth of 6 to 18 inches; frost action.
Lindside: Ld	Severe: flood hazard.	Severe: flood hazard.	Severe: flood hazard.	Moderate: flood hazard; seasonal high water table at a depth of 24 to 36 inches.	Moderate: flood hazard; seasonal high water table at a depth of 24 to 36 inches.	Moderate: seasonal high water table at a depth of 24 to 36 inches.
Lowell:						
LwB	Severe: slow permeability.	Moderate: gently sloping.	Moderate: moderate to high shrink-swell potential.	Moderate: slow permeability.	Moderate: slow permeability; gently sloping.	Moderate: moderate to high shrink-swell potential.
LwC	Severe: slow permeability.	Severe: sloping.	Moderate: moderate to high shrink-swell potential.	Moderate: slow permeability; sloping.	Severe: sloping	Severe: moderate to high shrink-swell potential; sloping.
LwD	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Moderate: moderate to high shrink-swell potential; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: moderate to high shrink-swell potential; strongly sloping.
LwE3	Severe: slow permeability; 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes; moderate to high shrink-swell potential.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Moderate: fine texture.	Slight	Slight.
Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: 6 to 12 percent slopes.	Moderate: sloping.	Slight.
Slight	Slight	Slight	Slight	Severe: subject to flooding.	Moderate: flood hazard.	Slight.
Severe: flood hazard.	Severe: flood hazard.	Slight	Moderate: flood hazard.	Severe: subject to overflow.	Severe: flood hazard.	Slight.
Moderate: seasonal high water table at a depth of 6 to 18 inches; frost action.	Severe: slow permeability; seasonal high water table at a depth of 6 to 18 inches; fragipan.	Moderate: seasonal high water table at a depth of 6 to 18 inches.	Moderate: seasonal high water table at a depth of 6 to 18 inches; fragipan.	Severe: seasonal high water table at a depth of 6 to 18 inches.	Severe: slow permeability; seasonal high water table at a depth of 6 to 18 inches; fragipan.	Moderate: seasonal high water table at a depth of 6 to 18 inches.
Moderate: seasonal high water table at a depth of 24 to 36 inches.	Moderate: seasonal high water table at a depth of 24 to 36 inches; slow permeability.	Slight	Slight	Severe: subject to flooding.	Moderate: seasonal high water table at a depth of 24 to 36 inches; flood hazard.	Slight.
Moderate: moderate to high shrink-swell potential; gently sloping.	Moderate: slow permeability; gently sloping.	Slight	Slight	Severe: bedrock at a depth of 42 to 84 inches.	Moderate: slow permeability.	Slight.
Moderate: sloping; moderate to high shrink-swell potential.	Severe: sloping; slow permeability.	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 42 to 84 inches.	Moderate: slow permeability; sloping.	Slight.
Severe: moderate to high shrink-swell potential; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 42 to 84 inches.	Severe: strongly sloping.	Moderate: strongly sloping.
Severe: 12 to 30 percent slopes; moderate to high shrink-swell potential.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: bedrock at a depth of 42 to 84 inches.	Severe: 12 to 30 percent slopes.	Moderate: 12 to 30 percent slopes; clayey surface.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
McAfee:						
MnC	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: moderately slow permeability; sloping.	Severe: sloping.	Severe: bedrock at a depth of 20 to 40 inches.
MnD	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.
Melvin: Mt	Severe: seasonal high water table at a depth of 0 to 6 inches; flood hazard.	Severe: flood hazard.	Severe: seasonal high water table at a depth of 0 to 6 inches; flood hazard.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Mercer:						
MuA	Severe: slow permeability; fragipan.	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches.
MuB	Severe: slow permeability; fragipan.	Moderate: gently sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan; gently sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches; gently sloping.
MuC	Severe: slow permeability; fragipan.	Severe: sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches; sloping.	Moderate: slow permeability; fragipan; sloping.	Severe: sloping; slow permeability; fragipan.	Moderate: sloping; seasonal high water table at a depth of 18 to 24 inches.
MvC3	Severe: slow permeability; fragipan.	Severe: sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches; sloping.	Moderate: slow permeability; fragipan; sloping.	Severe: sloping; slow permeability; fragipan.	Moderate: sloping; seasonal high water table at a depth of 18 to 24 inches.
Monongahela:						
MwA	Severe: slow permeability; fragipan.	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches.
MwB	Severe: slow permeability; fragipan.	Moderate: gently sloping.	Moderate: seasonal high water table at depth of 18 to 24 inches; gently sloping.	Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan.	Moderate: seasonal high water table at a depth of 18 to 24 inches; gently sloping.
MwC	Severe: slow permeability; fragipan.	Severe: sloping.	Moderate: sloping.	Moderate: slow permeability; fragipan.	Severe: sloping; slow permeability; fragipan.	Moderate: seasonal high water table; sloping.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: bedrock at a depth of 20 to 40 inches; sloping.	Severe: sloping; bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: bedrock at a depth of 20 to 40 inches; sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Slight.
Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Moderate: strongly sloping.
Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Slight	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Severe: slow permeability; fragipan.	Slight.
Moderate: seasonal high water table at a depth of 18 to 24 inches; gently sloping.	Moderate: slow permeability; fragipan; gently sloping.	Slight	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Severe: slow permeability; fragipan.	Slight.
Severe: sloping	Severe: sloping; slow permeability; fragipan.	Moderate: sloping.	Moderate: sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Severe: slow permeability; fragipan.	Slight.
Severe: sloping	Severe: sloping; slow permeability; fragipan.	Moderate: sloping.	Moderate: past erosion; sloping.	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Severe: slow permeability; fragipan.	Slight.
Moderate: seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Slight	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Severe: slow permeability; fragipan.	Slight.
Moderate: gently sloping; seasonal high water table at a depth of 18 to 24 inches.	Moderate: slow permeability; fragipan.	Slight	Slight	Moderate: seasonal high water table at a depth of 18 to 24 inches.	Severe: slow permeability; fragipan.	Slight.
Severe: sloping	Severe: slow permeability; fragipan; sloping.	Moderate: sloping.	Moderate: sloping.	Severe: slow permeability; fragipan.	Severe: slow permeability; fragipan.	Slight.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Newark: Ne	Severe: seasonal high water table at a depth of 6 to 18 inches; flood hazard.	Severe: flood hazard.	Severe: seasonal high water table at a depth of 6 to 18 inches; flood hazard.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: flood hazard.
Nicholson:						
NhB	Severe: slow permeability; fragipan.	Moderate: gently sloping.	Moderate: seasonal high water table at a depth of 24 to 36 inches.	Moderate: slow permeability; seasonal high water table at a depth of 24 to 36 inches; fragipan.	Moderate: slow permeability; seasonal high water table at a depth of 24 to 36 inches; fragipan.	Moderate: seasonal high water table at a depth of 24 to 36 inches.
NhC	Severe: slow permeability; fragipan; sloping.	Severe: sloping	Moderate: seasonal high water table; sloping.	Moderate: slow permeability; seasonal high water table; fragipan.	Severe: sloping	Moderate: seasonal high water table.
Opequon (Opequon part of RoE.)	Severe: moderately slow permeability; bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.
Otway:						
OtC	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: sloping; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: silty clay surface layer; moderately slow permeability.	Severe: silty clay surface layer; sloping; moderately slow permeability.	Severe: bedrock at a depth of 20 to 40 inches moderate to high shrink-swell potential; frost action.
OtE	Severe: moderately steep; bedrock at a depth of 20 to 40 inches; moderately slow permeability.	Severe: moderately steep; bedrock at a depth of 20 to 40 inches.	Severe: moderately steep; bedrock at a depth of 20 to 40 inches.	Severe: silty clay surface layer; moderately steep; moderately slow permeability.	Severe: silty clay surface layer; moderately steep; moderately slow permeability.	Severe: bedrock at a depth of 20 to 40 inches; moderate to high shrink-swell potential; frost action; moderately steep.
OtF	Severe: steep; moderately slow permeability.	Severe: steep	Severe: steep	Severe: silty clay surface layer; steep; moderately slow permeability.	Severe: silty clay surface layer; steep; moderately slow permeability.	Severe: steep; bedrock at a depth of 20 to 40 inches; moderate to high shrink-swell potential; frost action.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: flood hazard.	Severe: seasonal high water table at a depth of 6 to 18 inches.	Moderate: seasonal high water table at a depth of 6 to 18 inches; flood hazard.	Moderate: seasonal high water table at a depth of 6 to 18 inches; flood hazard.	Severe: subject to flooding.	Severe: seasonal high water table at a depth of 6 to 18 inches; flood hazard.	Moderate: seasonal high water table at a depth of 6 to 18 inches; flood hazard.
Moderate: seasonal high water table at a depth of 24 to 36 inches.	Moderate: slow permeability; seasonal high water table at a depth of 24 to 36 inches; fragipan.	Slight	Slight	Moderate: seasonal high water table at a depth of 24 to 36 inches.	Severe: slow permeability; seasonal high water table at a depth of 24 to 36 inches; fragipan.	Slight.
Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: seasonal high water table at a depth of 24 to 36 inches.	Severe: slow permeability; seasonal high water table at a depth of 24 to 36 inches; fragipan; sloping.	Slight.
Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.	Severe: bedrock at a depth of 10 to 20 inches.	Severe: bedrock at a depth of 10 to 20 inches; rock outcrops; moderately steep.	Severe: moderately steep.
Severe: bedrock at a depth of 20 to 40 inches; moderate to high shrink-swell potential; frost action; sloping.	Severe: silty clay surface layer; sloping; moderately slow permeability.	Severe: silty clay surface layer; sloping.	Severe: silty clay surface layer; sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; moderately slow permeability; silty clay surface layer.	Moderate: silty clay surface layer.
Severe: bedrock at a depth of 20 to 40 inches; moderate to high shrink-swell potential; frost action; moderately steep.	Severe: moderately steep; silty clay surface layer.	Severe: silty clay surface layer; moderately steep.	Severe: silty clay surface layer; moderately steep.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: moderately slow permeability; silty clay surface layer; moderately steep; bedrock at a depth of 20 to 40 inches.	Severe: moderately steep; silty clay surface layer.
Severe: steep; bedrock at a depth of 20 to 40 inches; moderate to high shrink-swell potential; frost action.	Severe: silty clay surface layer; steep; slow permeability.	Severe: steep	Severe: steep	Severe: bedrock at a depth of 20 to 40 inches.	Severe: steep; moderately slow permeability; silty clay surface layer; bedrock at a depth of 20 to 40 inches.	Severe: steep; silty clay surface layer.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Rarden:						
RaC	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: sloping.	Severe: moderate to high shrink-swell potential.	Moderate: slow permeability.	Severe: sloping; slow permeability.	Severe: moderate to high shrink-swell potential; frost action; bedrock at a depth of 20 to 40 inches.
RaD2	Severe: slow permeability; strongly sloping; bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping.	Severe: moderate to high shrink-swell potential; strongly sloping.	Severe: slow permeability; strongly sloping.	Severe: slow permeability; strongly sloping.	Severe: moderate to high shrink-swell potential; frost action; strongly sloping.
Robertsville: Rb.	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches; fragipan.	Slight	Severe: seasonal high water table at a depth of 0 to 6 inches; frost action.	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches; fragipan.	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches; fragipan.	Severe: seasonal high water table at a depth of 0 to 6 inches; frost action.
Rockcastle:						
RcC	Severe: slow permeability; shale at a depth of 20 to 40 inches.	Severe: shale at a depth of 20 to 40 inches; sloping.	Severe: shale at a depth of 20 to 40 inches.	Moderate: slow permeability; sloping.	Severe: slow permeability; sloping.	Moderate: shale at a depth of 20 to 40 inches; sloping.
RcD	Severe: slow permeability; shale at a depth of 20 to 40 inches; strongly sloping.	Severe: shale at a depth of 20 to 40 inches; strongly sloping.	Severe: shale at a depth of 20 to 40 inches; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; slow permeability.	Severe: strongly sloping; shale at a depth of 20 to 40 inches.
RcE	Severe: slow permeability; shale at a depth of 20 to 40 inches; moderately steep.	Severe: shale at a depth of 20 to 40 inches; moderately steep.	Severe: moderately steep; shale at a depth of 20 to 40 inches.	Severe: moderately steep; slow permeability.	Severe: moderately steep; slow permeability.	Severe: moderately steep.
Shelbyville:						
ShA	Moderate: moderately slow permeability.	Moderate: unfavorable permeability.	Slight	Slight	Slight	Slight
ShB	Moderate: moderately slow permeability.	Moderate: unfavorable permeability; gently sloping.	Slight	Slight	Moderate: gently sloping.	Slight
ShC	Moderate: moderately slow permeability.	Severe: sloping; unfavorable permeability.	Moderate: sloping.	Moderate: sloping.	Severe: sloping.	Moderate: sloping.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: moderate to high shrink-swell potential; frost action; sloping; bedrock at a depth of 20 to 40 inches.	Severe: sloping; slow permeability.	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slow permeability; bedrock at a depth of 20 to 40 inches.	Slight.
Severe: moderate to high shrink-swell potential; frost action; strongly sloping.	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: slow permeability; strongly sloping; bedrock at a depth of 20 to 40 inches.	Moderate: strongly sloping.
Severe: seasonal high water table at a depth of 0 to 6 inches; frost action.	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches; fragipan.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: seasonal high water table at a depth of 0 to 6 inches; fragipan.	Severe: seasonal high water table at a depth of 0 to 6 inches.	Severe: slow permeability; seasonal high water table at a depth of 0 to 6 inches; fragipan.	Severe: seasonal high water table at a depth of 0 to 6 inches.
Severe: sloping; shale at a depth of 20 to 40 inches.	Severe: sloping; slow permeability.	Moderate: sloping; shale at a depth of 20 to 40 inches.	Moderate: shale at a depth of 20 to 40 inches; sloping.	Severe: shale at a depth of 20 to 40 inches.	Severe: slow permeability; shale at a depth of 20 to 40 inches.	Slight.
Severe: strongly sloping; shale at a depth of 20 to 40 inches.	Severe: strongly sloping; slow permeability.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: shale at a depth of 20 to 40 inches.	Severe: slow permeability; strongly sloping; shale at a depth of 20 to 40 inches.	Moderate: strongly sloping.
Severe: moderately steep.	Severe: moderately steep; slow permeability.	Severe: moderately steep.	Severe: moderately steep.	Severe: shale at a depth of 20 to 40 inches.	Severe: moderately steep; slow permeability; shale at a depth of 20 to 40 inches.	Severe: moderately steep.
Slight	Slight	Slight	Slight	Moderate: soil texture medium to fine.	Slight	Slight.
Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Moderate: soil texture medium to fine.	Slight	Slight.
Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: 6 to 12 percent slopes.	Moderate: sloping.	Slight.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter fields	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Shelocta: SlD	Severe: 12 to 25 percent slopes.	Severe: 12 to 25 percent slopes.	Severe: moderately steep; 12 to 25 percent slopes.	Severe: moderately steep; 12 to 25 percent slopes.	Severe: 12 to 25 percent slopes.	Severe: 12 to 25 percent slopes.
Shrouts:						
SrC	Severe: slow permeability.	Severe: sloping	Severe: high shrink-swell potential.	Moderate: slow permeability; sloping.	Severe: slow permeability; sloping.	Moderate: sloping.
SrE	Severe: slow permeability; 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: high shrink-swell potential; 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes; slow permeability.	Severe: 12 to 30 percent slopes; slow permeability.	Severe: 12 to 30 percent slopes.
SuE3	Severe: slow permeability; 6 to 30 percent slopes.	Severe: 6 to 30 percent slopes.	Severe: high shrink-swell potential; 6 to 30 percent slopes.	Severe: clayey surface; 6 to 30 percent slopes.	Severe: clayey surface; 6 to 30 percent slopes.	Severe: 6 to 30 percent slopes; high shrink-swell potential.
Tate:						
TaB	Moderate: bedrock at a depth of 42 to 72 inches.	Moderate: moderate permeability; gently sloping.	Slight	Slight	Moderate: gently sloping.	Moderate: bedrock at a depth of 42 to 72 inches.
TaC	Moderate: sloping.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: sloping	Moderate: sloping.
TaD2	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.
Trappist:						
TrB	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.	Moderate: moderately slow permeability.	Moderate: slow permeability; gently sloping.	Severe: bedrock at a depth of 20 to 40 inches.
TrC	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: slow permeability; sloping.	Severe: sloping	Severe: bedrock at a depth of 20 to 40 inches; sloping.
TrD	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.
TsC3	Severe: moderately slow permeability; bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Moderate: moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches; sloping.	Moderate: slow permeability; clayey surface; sloping.	Severe: sloping	Severe: moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches; sloping.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: 12 to 25 percent slopes.	Severe: 12 to 25 percent slopes.	Severe: 12 to 25 percent slopes.	Severe: 12 to 25 percent slopes.	Severe: slopes over 12 percent.	Severe: 12 to 25 percent slopes.	Moderate: 12 to 25 percent slopes.
Severe: sloping	Severe: sloping; slow permeability.	Moderate: sloping.	Moderate: sloping.	Severe: fine soil texture.	Severe: slow permeability.	Slight.
Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes; slow permeability.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: slopes over 12 percent.	Severe: slow permeability; 12 to 30 percent slopes.	Moderate: 12 to 30 percent slopes.
Severe: 6 to 30 percent slopes; high shrink-swell potential.	Severe: slow permeability; clayey surface; 6 to 30 percent slopes.	Severe: clayey surface; 6 to 30 percent slopes.	Severe: clayey surface; 6 to 30 percent slopes; past erosion.	Severe: slopes over 12 percent.	Severe: slow permeability; clayey surface; 6 to 30 percent slopes.	Severe: clayey surface.
Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Severe: bedrock at a depth of 42 to 72 inches.	Slight	Slight.
Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 42 to 72 inches.	Moderate: sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: slopes over 12 percent.	Severe: strongly sloping.	Moderate: strongly sloping.
Severe: low to moderate shrink-swell potential; bedrock at a depth of 20 to 40 inches; gently sloping.	Moderate: moderately slow permeability; bedrock at a depth of 20 to 40 inches; gently sloping.	Slight	Moderate: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; gently sloping.	Slight.
Severe: sloping	Severe: sloping; bedrock at a depth of 20 to 40 inches.	Moderate: sloping.	Moderate: bedrock at a depth of 20 to 40 inches; sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; sloping.	Slight.
Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: strongly sloping; bedrock at a depth of 20 to 40 inches.	Moderate: strongly sloping.
Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: past erosion; sloping.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches; past erosion.	Moderate: clayey surface.

TABLE 6.—*Limitations of soils for*

Soil series and map symbols	Septic tank filter field	Sewage lagoons	Locations for buildings of three stories or less (with basements)	Campsites (intensive use)		County and access roads
				Tents	Trailers	
Weikert: WeG	Severe: bedrock at a depth of 10 to 20 inches; very steep.	Severe: moderately rapid permeability; bedrock at a depth of 10 to 20 inches; very steep.	Severe: very steep.	Severe: very steep.	Severe: very steep.	Severe: very steep.
Whitley:						
WhB	Moderate: bedrock at a depth of 42 to 72 inches.	Moderate: moderate permeability; gently sloping.	Moderate: bedrock at a depth of 42 to 72 inches.	Slight	Moderate: gently sloping.	Moderate: bedrock at a depth of 42 to 72 inches.
WhC	Moderate: sloping; bedrock at a depth of 42 to 72 inches.	Severe: sloping	Moderate: sloping; bedrock at a depth of 42 to 72 inches.	Moderate: sloping.	Severe: sloping	Moderate: sloping; bedrock at a depth of 42 to 72 inches.
WhD	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.
Woolper:						
WoB	Severe: moderately slow permeability.	Moderate: gently sloping.	Moderate: moderate to high shrink-swell potential.	Moderate: moderately slow permeability.	Moderate: slow permeability.	Moderate: moderate to high shrink-swell potential.
WoC	Severe: moderately slow permeability.	Severe: sloping	Moderate: moderate to high shrink-swell potential; sloping.	Moderate: slow permeability; sloping.	Severe: sloping	Severe: moderate to high shrink-swell potential.
WpE	Severe: moderately slow permeability; 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: moderate to high shrink-swell potential; 12 to 30 percent slopes.

town and country planning—Continued

Streets and parking lots in subdivisions	Athletic fields (intensive use)	Picnic and play areas (extensive use)	Golf fairways, lawns, and landscaping	Sanitary land fill (trench method)	Cemeteries	Paths and trails
Severe: very steep.	Severe: very steep.	Severe: very steep.	Severe: very steep.	Severe: slopes over 40 percent.	Severe: very steep.	Severe: coarse fragments; very steep.
Moderate: gently sloping; bedrock at a depth of 42 to 72 inches.	Moderate: gently sloping.	Slight	Slight	Severe: bedrock at a depth of 42 to 72 inches.	Slight	Moderate: bedrock at a depth of 42 to 72 inches.
Severe: sloping; bedrock at a depth of 42 to 72 inches.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: bedrock at a depth of 42 to 72 inches.	Moderate: sloping.	Moderate: bedrock at a depth of 42 to 72 inches.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: slopes over 12 percent.	Severe: strongly sloping.	Moderate: strongly sloping.
Moderate: moderate to high shrink-swell potential.	Moderate: moderately slow permeability; gently sloping.	Moderate: silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Severe: fine soil texture.	Moderate: slow permeability.	Moderate: silty clay loam surface layer.
Severe: moderate to high shrink-swell potential; sloping.	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Severe: fine soil texture.	Moderate: slow permeability; sloping.	Moderate: silty clay loam surface layer.
Severe: moderate to high shrink-swell potential; 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.	Severe: bedrock at a depth of 6 to 18 inches.	Severe: slow permeability; 12 to 30 percent slopes.	Severe: 12 to 30 percent slopes.

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Lawns, landscaping, and golf fairways.—The soils are rated for these uses under the assumption that soil material at the site will be used, rather than trucked-in fill or topsoil. The ratings are based on depth to seasonal water table, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and hazard of flooding.

Sanitary land fill.—The soils are rated in terms of suitability for use as disposal areas for trash and garbage. It is assumed that the operation will be by trench method. No importation of fill or cover material is considered in the ratings. The ratings are based on depth to seasonal water table, permeability, slop, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and hazard of flooding.

Cemeteries.—These are community-type cemeteries. The soils are rated under the assumption that soil material at the site will be used, rather than trucked-in fill or topsoil. The rating are based on depth to seasonal water table, slope, permeability, depth to bedrock, surface rockiness and stoniness, texture of the surface layer, and hazard of flooding.

Paths and trails.—The ratings are for nonintensive uses such as cross-country hiking and bridle paths that allow random movement of people. It is assumed that the areas will be used as they occur in nature. The ratings are based on wetness, slope, surface rockiness and stoniness, texture of the surface layer, and hazard of flooding.

Formation and Classification of the Soils

This section has two parts. The first part describes the factors of soil formation and their relation to the soils in Madison County. In the second part, the comprehensive system of soil classification is explained and a table shows the placement of the soils in this system and in the great soil groups of the former classification system.

Formation of Soils

The characteristics of the soil at any given point depend on climate; on the physical and chemical composition of parent material; on relief; on living organisms; and on time. Soil is formed by the interaction of these five factors. The relative importance of each factor differs from one area to another. In some areas one factor may dominate in the formation of soil characteristics, and in other areas another factor may dominate. Climate and plant and animal life are not likely to vary much in an area the size of a county, but there may be many local differences in relief and parent material.

Since the interrelationships among the five factors are complex, the effects of any one factor are hard to determine. Some ways that each of these factors have influenced the formation of soils in Madison County are briefly discussed in the following paragraphs.

Climate

Climate affects the physical, chemical, and biological relationships in the soil. It influences the kind and number of plants and animals, the weathering of rocks and minerals, erosion, and the rate of soil formation.

The climate of Madison County is temperate and moist, and it is presumed to have been similar throughout soil formation. Since the soils were moist and subject to leaching during formation, the soluble bases have been largely leached out of the solum, and clay minerals have moved from the surface layer into the subsoil. As a result, many of the soils are acid and have a high content of clay in the subsoil. The Lowell and Faywood soils are examples. The climate is uniform throughout the county, and differences among soils are not an effect of climate.

Parent material

Parent material is the unconsolidated mass in which a soil formed. The soils in Madison County formed mostly in residual material weathered from the underlying rock, and in alluvium washed from these kinds of soils and deposited along streams. The parent materials vary widely and account for many differences among the soils in Madison County.

Most soils in the county formed in material weathered from limestone or calcareous shales. Lowell and Caleast soils are examples. These materials are high in clay and calcium carbonate and are medium in phosphate content. Soils in the northwestern part of the county formed in material weathered from calcareous siltstone, and they are coarser textured than those formed from limestone. The Culleoka soils are an example. The soils in the Knobs section of the county formed largely in material weathered from acid black and gray shales. The Rockcastle and Colyer soils are examples. These materials are high in clay content and very strongly acid. Most soils in the Mountain section of Madison County formed in materials weathered from acid siltstone. This material is high in silt and very strongly acid. The Whitley and Weikert soils are examples.

Relief

Relief influences the formation of soils through its effect on drainage, erosion, plant cover, and soil temperature. Relief varies widely and accounts for many differences among soils in Madison County.

Steep soils are shallow and show only slight development because geologic erosion is rapid and little water infiltrates and percolates through the soil. The Cynthiana and Colyer soils are examples. Soils on broad flats or in depressed areas have an excess of water during formation. Little material is lost through erosion and soil continues to accumulate. A gray subsoil is characteristic because of a lack of oxidation. In time, a fragipan develops under these conditions. The Lawrence soils are an example. Gently sloping and sloping soils show more clearly the influence of all soil-forming factors. Runoff is moderate without excessive erosion, and a normal soil profile is developed. Shelbyville and Lowell soils are examples.

Living organisms

Plants, animals, insects, bacteria, and fungi are important in the formation of soils. Living organisms affect the organic-matter and plant-nutrient content and soil structure.

The kinds of plants, either trees or grasses, caused differences among soils in Madison County. Most soils formed under hardwood forests and have a light-colored surface layer that is low in organic-matter content. The Trappist and Lowell soils are examples. Some soils formed under

mixed forest and grass and have a dark surface layer that is 8 to 10 inches thick. The Shelbyville soils are an example. A few soils formed under swamp-type vegetation and have a thick, dark surface layer that is 18 to 24 inches thick. The Dunning and Blago soils are examples.

Time

The length of time that the processes of soil formation have been in progress is reflected in the degree of development of the soil profile. A young soil has very little horizon development, and a mature soil has well-expressed soil horizons.

Huntington soils that formed in alluvium on flood plains are examples of young soils. Except for the accumulation of organic matter in the surface layer, they retain most of the characteristics of the parent material. Lowell and Mercer soils formed in material weathered from limestone and have well-developed soil horizons. They are examples of mature soils.

Classification of Soils

Soils are classified so that we can more readily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation (*6*). First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

In classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries, and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*15*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study (*14*, *17*). Therefore, readers interested in developments of the current system should search the latest literature available. In this subsection some of the classes in the current system and the great soil groups in the older system are given for each soil series in table 7. The classes in the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates.

Table 7 shows the four soil orders in Madison County—Inceptisols, Mollisols, Alfisols, and Ultisols. Inceptisols are soils that have weakly expressed horizons or the beginnings of such horizons. Mollisols have a thick, soft, friable surface layer that has been darkened by organic matter. Alfisols have a clay-enriched B horizon that is high in base saturation. Ultisols are soils that are highly developed but still contain some weatherable minerals.

SUBORDER: Each order is subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUP: Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and their features. The horizons used to make separations are those in which clay, iron, or humus have accumulated or those that have pans interferring with growth of roots or movement of water. The features used are the self-mulching properties of clay, soil tempertaure, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 7, because it is the last word in the name of the subgroup.

SUBGROUP: Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Hapludalfs.

FAMILY: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. An example is fine, mixed, mesic family of Typic Hapludalfs.

SERIES: The series consists of a group of soils that formed in a particular kind of parent material and have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

New soil series must be established and concepts of some established series, expecially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series concept at National, State, and regional levels of responsibility for soil classification results in a judgment that the new series should be established. Most of the soil series described in this publication have been established earlier.

General Nature of the County

This section provides general information about Madison County. It briefly describes the history and development; physiography, geology, relief, and drainage; farming; and climate of the county.

TABLE 7.—*Soil series classified according to the current system of classification and the revised 1938 system*

Series	Current classification			Great soil group (1938 classification)
	Family	Subgroup	Order	
Beasley	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Berea	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Blago	Clayey, mixed, mesic	Typic Umbraquults	Ultisols	Humic Gley soils.
Boonesboro	Fine-loamy, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Brassfield	Fine-loamy, carbonatic, mesic	Rendollic Eutrochrepts	Inceptisols	Regosols.
Caleast	Fine, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Caneyville	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Red-Yellow Podzolic soils.
Captina	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Colyer	Clayey, skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Culleoka	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Cynthiana	Clayey, mixed, mesic	Lithic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Lithosols.
Dunning	Fine, mixed, noncalcareous, mesic.	Fluventic Haplaquolls	Mollisols	Humic Gley soils.
Eden	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Egam [1]	Fine, mixed, thermic	Cumulic Hapludolls	Mollisols	Alluvial soils.
Elk	Fine-silty, mixed, mesic	Ultic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Fairmount	Clayey, mixed, mesic, shallow	Typic Hapludolls	Mollisols	Rendzina soils.
Faywood	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Hagerstown [2]	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Reddish-Brown Lateritic soils intergrading to Gray-Brown Podzolic soils.
Huntington	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Kickapoo	Coarse-loamy, mixed, nonacid, mesic.	Typic Udifluvents	Entisols	Alluvial soils.
Lawrence	Fine-silty, mixed, mesic	Aquic Fragiudalfs	Alfisols	Planosols.
Lindside	Fine-silty, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Lowell	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
McAfee	Fine, mixed, mesic	Mollic Hapludalfs	Alfisols	Reddish-Brown Lateritic soils intergrading to Lithosols.
Melvin	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils intergrading to Alluvial soils.
Mercer	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols	Red-Yellow Podzolic soils.
Monongahela	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Newark	Fine-silty, mixed, nonacid, mesic	Aeric Fluventic Haplaquepts.	Inceptisols	Alluvial soils.
Nicholson	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Opequon	Clayey, mixed, mesic	Lithic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Lithosols.
Otway	Fine, carbonatic, mesic	Ultrochreptic Rendolls	Mollisols	Rendzina soils.
Rarden	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Robertsville	Fine-silty, mixed, mesic	Typic Fraqiaquults	Ultisols	Planosols.
Rockcastle	Fine, mixed, mesic	Typic Dystrochrepts	Inceptisols	Lithosols.
Shelbyville	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Shelocta	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Shrouts	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols	Solonetz soils.
Tate [3]	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Trappist	Clayey, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Weikert	Loamy, skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Whitley	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Woolper	Fine, mixed, mesic	Typic Argiudolls	Mollisols	Gray-Brown Podzolic soils.

[1] Egam soils have a lower average temperature than the defined range for the series.

The Ap horizon in these soils is darker colored than the defined range for the series.

[3] These soils lack a component of igneous rocks in the parent material and have more reddish colors in the B horizon than defined for the series. Because of changes in the classification system, these soils would now be correlated with the Allegheny series.

History and Development

Madison County was created by the Virginia Legislature in 1786 and was named for James Madison, who later became the fourth President of the United States. Boonesborough, the second settlement in Kentucky, is on the south bank of the Kentucky River in Madison County. Millford, an early settlement that no longer exists, was the first county seat. When Kentucky was admitted to the Union, the county seat was moved to Richmond by one of the first acts of the State Legislature. During its early history, Madison County was mainly a producer of agricultural products, just as it is today.

Eastern Kentucky University and several industrial plants are now located at Richmond. Berea College and several industrial plants are located at Berea in the southern part of the county. Some smaller farms are operated only on a part-time basis because of increased industrial and commercial growth.

Physiography, Geology, Relief, and Drainage

The physiographic areas of Madison County are the Hills of the Bluegrass, the Outer Bluegrass, the Knobs, and the Mountains.

The Hills of the Bluegrass is an area in the northwestern section of the county that consists of long narrow ridgetops and deep valleys with long steep slopes. The soils in this area are underlain by middle and upper Ordovician limestone and shale.

The Knobs area is a narrow band across the county just north of the mountains that separates the Mountains from the Outer Bluegrass. Around Berea, the Knobs area consists of wide, nearly level areas between rough, black-shale hills. In the eastern part it consists of narrow ridgetops dissected by many steep drainageways and rough, black-shale hills. The soils in the area are underlain by Devonian and Lower Mississippian acid shales.

The Mountains is an area of narrow flood plains and long steep mountainsides that extend from east to west across the southern part of the county. The soils in this area are underlain by Mississippian siltstone, shale, and limestone and by Pennsylvanian sandstone.

All of Madison County is in the Kentucky River Watershed, and all surface drainage flows to the Kentucky River.

Most of the surface drainage flows northward from the mountains to the Kentucky River, mainly by way of Paint Lick, Silver, Muddy, and Drowning Creeks. Tate and Otter Creeks start in the vicinity of Richmond and flow northward to the Kentucky River. Red Lick Creek is an exception, as it flows eastward through Estill County to the Kentucky River.

Farming

Farming in Madison County is the largest source of income. Tobacco accounts for about half the income, and livestock the other half. Madison County has long been considered the largest beef cattle producing county in Kentucky (fig. 12). Other livestock enterprises of minor importance are hogs, sheep, and dairy cattle.

Most crops are fed to livestock. All of the large acreage of pasture and hay is utilized by livestock. Corn is the main grain and silage crop. Red clover, alfalfa, and lespedeza grown in mixtures with grass are the main hay crops. Bluegrass, fescue, and orchardgrass in mixtures with clover are the main pasture plants. Most of the mountainous areas of the county is in woods.

Climate

The climate of Madison County is temperate, and favorable for many types of plants and animals. Generally, summers are warm and humid and winters are moderately cold. Average precipitation is fairly well distributed throughout the year.

Temperature data are given in table 8, and probabilities of freezing temperatures in spring and fall are given in table 9. The average length of the growing season is about 200 days.

Precipitation data are given in table 8. Most soils are saturated with water in the spring, as winter and early in spring are the seasonal recharge periods. During years of average rainfall, adequate moisture is available for crops. Drought periods are most common late in summer and in fall. Chances are 1 in 10 that September will have less than 1 inch of rain. Such a condition would have severe drought effects on late crops and pasture. Chances are 1 in 10 that any summer month will have less than 2 inches of rain. Combined with high temperatures, this condition would begin to affect most crops after one month, and on shallow soils the effects would be severe. Soils on broad flats and in depressed areas have some rather prolonged wet periods that occur mostly in the spring during years of above-average rainfall.

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Figure 12.—**Pasture of orchardgrass and white clover on Lowell silt loam, 6 to 12 percent slopes. This pasture is used by beef cattle.**

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Glossary

Acidity. See Reaction, soil.

Alluvium. Fine material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil depth.

TABLE 8.—*Temperature and precipitation* [1]

[Data from U.S. National Weather Service Station at Richmond, Kentucky]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with— Maximum temperature equal to or higher than—	Two years in 10 will have at least 4 days with— Minimum temperature equal to or lower than—	Average monthly total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Days with snow cover 1.0 inch or more	Average depth of snow on days with snow cover
	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Number	Inches
January	45	28	64	8	5.1	1.5	8.0	5	3
February	47	28	65	12	4.0	1.3	7.5	6	3
March	55	35	72	18	4.9	2.5	7.2	3	4
April	67	45	82	31	4.0	2.1	5.8	(2)	1
May	76	54	88	40	3.9	1.7	6.0	0	0
June	84	63	93	51	4.8	2.0	7.9	0	0
July	86	66	95	57	5.1	2.1	9.0	0	0
August	86	65	94	55	4.1	1.6	7.0	0	0
September	81	58	93	45	3.0	1.0	4.7	0	0
October	71	47	84	33	2.1	.7	3.5	0	0
November	56	36	74	22	3.4	1.2	5.8	2	2
December	46	29	64	12	3.6	1.6	6.2	3	2
Year	67	46	[3] 97	[4] 0	48.0	35.9	56.9	19	3

[1] Record for the period 1931–60.
[2] Less than 0.5 day.
[3] Average annual highest maximum.
[4] Average annual lowest minimum, based on 1948–60 data.

TABLE 9.—*Probabilities of last freezing temperatures in spring and first in fall at Richmond, Kentucky* [1]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 17	March 27	April 4	April 19	April 26
2 years in 10 later than	March 9	March 20	March 29	April 13	April 21
5 years in 10 later than	February 23	March 8	March 17	April 2	April 11
Fall:					
1 year in 10 earlier than	November 26	November 15	November 4	October 26	October 13
2 years in 10 earlier than	December 1	November 21	November 10	November 1	October 18
5 years in 10 earlier than	December 11	December 1	November 20	November 10	October 28

[1] All freeze data are based on temperatures in a standard U.S. National Weather Service thermometer shelter at a height of approximately 5 feet above the ground and in a representative exposure. Lower temperatures will occur at times nearer the ground or in local areas subject to extreme air drainage, or both.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. Nearly level land on the bottom of a valley that has a stream flowing through it. Subject to flooding and often referred to as a flood plain.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Also called clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretion. Hard grains, pellets, or nodules of various sizes, shapes, and colors, consisting of concentrations of compounds that cement the soil grains together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, is readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material; tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Is hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Depth, soil. Thickness of soil over a specified layer that generally does not permit the growth of roots. Classes used in this survey are:

Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 inches or more

Diversion or diversion terrace. A ridge of earth, generally a terrace, built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage, internal. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Drainage, natural. The conditions that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural drainage are—

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and C horizons.

Somewhat poorly drained soils are wet for significant periods; Podzolic soils commonly are mottled below a depth of 6 to 16 inches in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and light gray and generally mottled from the surface downward, although mottling may be absent, or nearly so, in some places.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in deeper parts of the profile.

Drainage, surface. Runoff, or surface flow, of water from an area.

Erosion. The wearing away of the land surface by wind, running water, and other geological agents.

Fertility, soil. The quality that enables a soil to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as moisture, light, temperature, and the physical condition (or tilth) of the soil, are favorable.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A dense brittle subsurface horizon very low in organic matter and clay but rich in silt or very fine sand. The layer seems to be cemented when it is dry, is hard or very hard, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick, and they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and it is therefore characterized by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizons.—The mineral horizon below an A horizon. The B is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; by prismatic or blocky structure; by redder or stronger colors than the A horizon; or by some combination of these. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath the A and B horizons.

Leaching. The removal of soluble materials from soils by percolating water.

Loess. A fine-grained eolian deposit consisting dominantly of silt-sized particles.

Marl. An earthy, unconsolidated deposit formed in fresh-water lakes that consists chiefly of calcium carbonate mixed with various amounts of clay or other impurities.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch)in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension: and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material. The horizon of weathered rock or partly weathered soil material from which soil has formed.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour", soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residuum is not soil but is frequently the material in which a soil has formed.

Root zone. The part of the soil that is penetrated, or can be penetrated by plant roots.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 millimeter to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slope, gradient. Terms used in this survey to describe the range of slopes are: *nearly level,* 0 to 2 percent; *gently sloping,* 2 to 6 percent; *sloping,* 6 to 12 percent; *strongly sloping,* 12 to 20 percent; *moderately steep,* 20 to 30 percent; *steep,* 30 to 50 percent; and *very steep,* more than 50 percent.

Soil. The natural medium for the growth of land plants on the surface of the earth; it is composed of organic and mineral materials.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer below the solum, either conforming (C or R) or unconforming.

Surface soil. The soil ordinarily moved in tillage or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (constructed). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). A level or gently undulating old alluvial plain bordering a stream valley, river, lake, or the sea. Elevation is intermediate between the flood plain and the upland.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand and sandy loam classes may be further divided by specifing "coarse," "fine," or "very fine."

Upland. Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Variegation. Contrasting color patches that vary in number and size; assumed to be inherited from the parent material rather than to be the result of poor drainage.

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

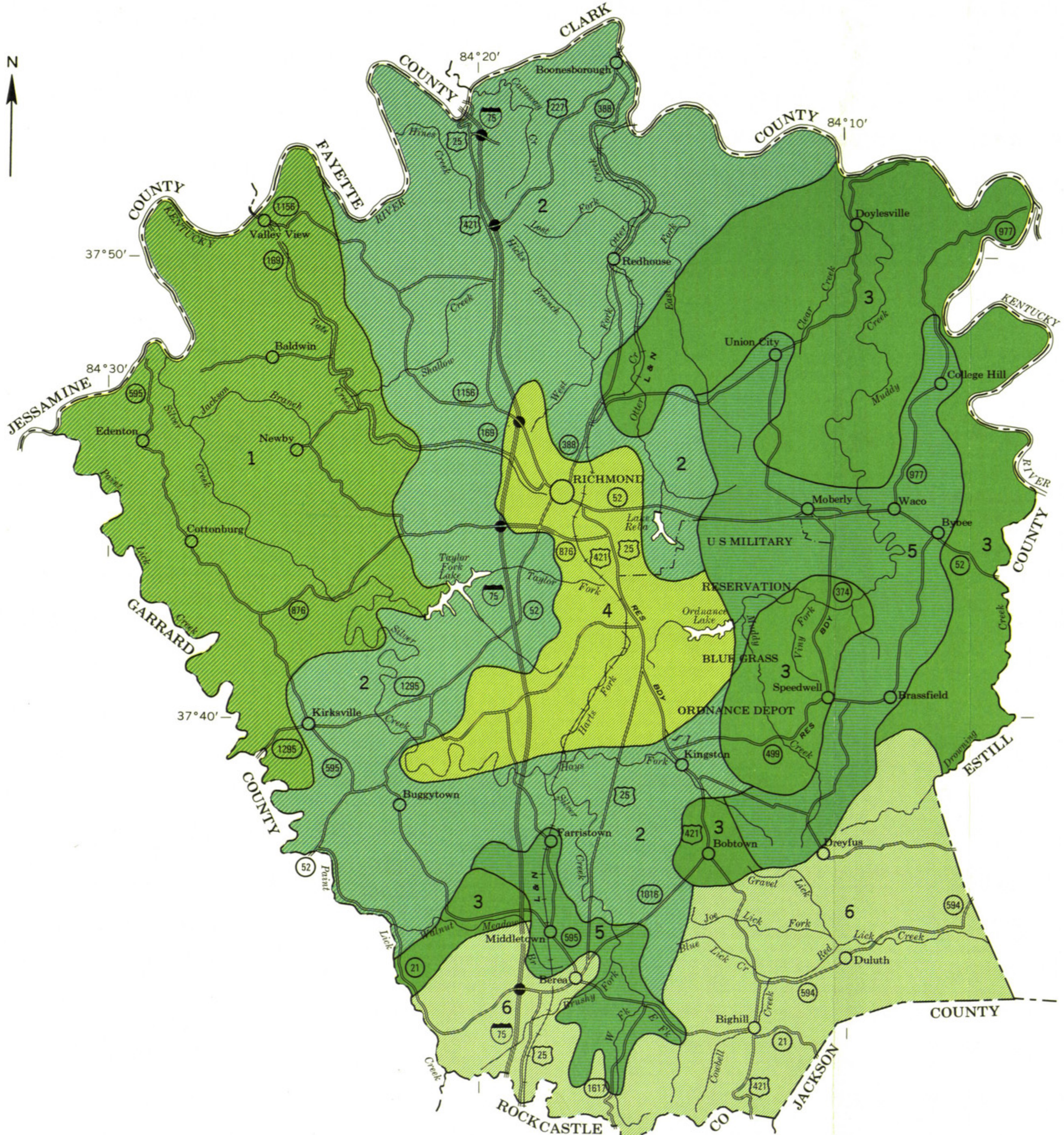
KENTUCKY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

MADISON COUNTY, KENTUCKY

Scale 1:190,080

1 0 1 2 3 4 Miles



SOIL ASSOCIATIONS

1. Culleoka-Eden association: Moderately deep, well-drained, gently sloping soils on narrow ridgetops and moderately deep and deep, well-drained, steep soils on side slopes
2. Lowell-Faywood-Cynthiana-Rock outcrop association: Deep, well-drained, gently sloping soils on fairly wide ridgetops and moderately deep and shallow, sloping to steep soils on side slopes
3. Beasley-Brassfield-Otway association: Deep, well-drained, gently sloping to sloping soils on narrow ridgetops and moderately deep, well-drained, strongly sloping to steep soils on side slopes
4. Shelbyville-Mercer-Nicholson association: Deep, well-drained to moderately well drained, level to gently sloping soils on wide ridgetops and deep, well drained to moderately well drained, sloping soils along drainageways
5. Lawrence-Mercer-Robertsville association: Somewhat poorly drained and poorly drained soils on broad flats; moderately well drained, level to gently sloping soils on wide ridgetops; and moderately well drained, sloping soils along drainageways
6. Colyer-Weikert-Captina association: Shallow, steep soils on mountain sides and on side slopes of knobs and moderately well drained, level to sloping soils along flood plains

This map is for general planning. It shows only the major soils and does not contain sufficient detail for operational planning.

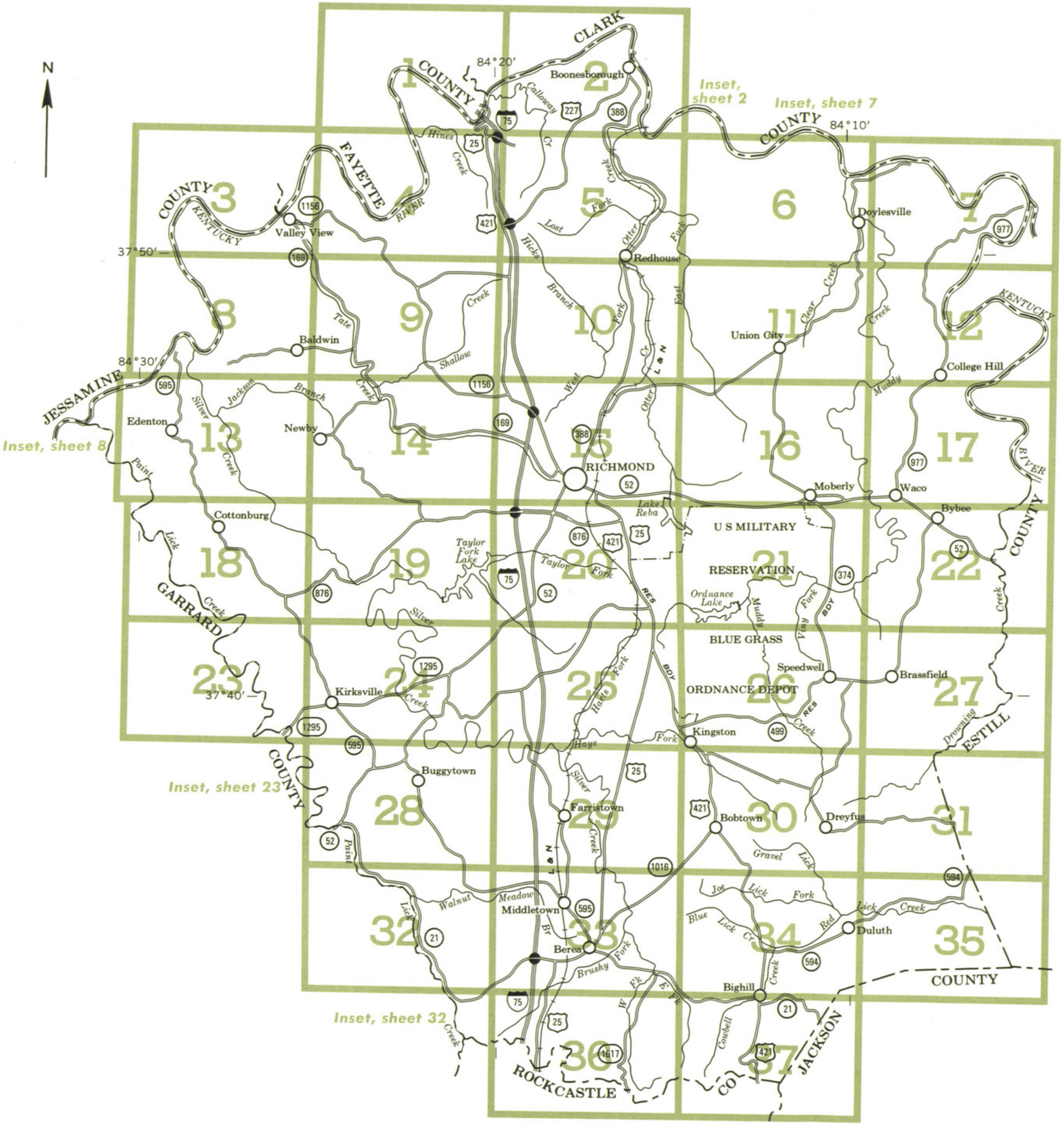
Published 1971

INDEX TO MAP SHEETS

MADISON COUNTY, KENTUCKY

Scale 1:190,080

1 0 1 2 3 4 Miles



SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, F, or G, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range of slope. A final number, 2 or 3, in the symbol indicates that the slope is eroded or severely eroded.

SYMBOL	NAME
AlF	Alluvial land, steep
BaB	Beasley silt loam, 2 to 6 percent slopes
BaC	Beasley silt loam, 6 to 12 percent slopes
BaD	Beasley silt loam, 12 to 20 percent slopes
BcC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded
BcD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded
BeA	Berea silt loam, 0 to 2 percent slopes
BeB	Berea silt loam, 2 to 6 percent slopes
BeC	Berea silt loam, 6 to 12 percent slopes
Bg	Blago silt loam
Bo	Boonesboro silt loam
BrC	Brassfield silt loam, 6 to 12 percent slopes
BrE	Brassfield silt loam, 12 to 30 percent slopes
BrF	Brassfield silt loam, 30 to 50 percent slopes
CaB	Caleast silt loam, 2 to 6 percent slopes
CaC	Caleast silt loam, 6 to 12 percent slopes
CeF	Caneyville very stony silt loam, 35 to 60 percent slopes
CnA	Captina silt loam, 0 to 2 percent slopes
CnB	Captina silt loam, 2 to 6 percent slopes
CnC	Captina silt loam, 6 to 12 percent slopes
CnC3	Captina silt loam, 6 to 12 percent slopes, severely eroded
CoF	Colyer shaly silt loam, 12 to 50 percent slopes
CsF3	Colyer shaly silty clay loam, 12 to 50 percent slopes, severely eroded
CuB	Culleoka silt loam, 2 to 6 percent slopes
CuC	Culleoka silt loam, 6 to 12 percent slopes
CuD	Culleoka silt loam, 12 to 20 percent slopes
CwE	Culleoka flaggy silt loam, 20 to 30 percent slopes
CwF	Culleoka flaggy silt loam, 30 to 50 percent slopes
CyE	Cynthiana-Rock outcrop complex, 12 to 30 percent slopes
Du	Dunning silty clay loam
EdD2	Eden silty clay loam, 6 to 20 percent slopes, eroded
EeE2	Eden flaggy clay, 20 to 30 percent slopes, eroded
EeF2	Eden flaggy clay, 30 to 50 percent slopes, eroded
Eg	Egam silty clay loam
ElA	Elk silt loam, 0 to 2 percent slopes
ElB	Elk silt loam, 2 to 6 percent slopes
ElC	Elk silt loam, 6 to 12 percent slopes
ElD	Elk silt loam, 12 to 20 percent slopes
FaF	Fairmount-Rock outcrop complex, 30 to 60 percent slopes
FdC	Faywood silt loam, 6 to 12 percent slopes
FdE	Faywood silt loam, 12 to 30 percent slopes
Gu	Gullied land
HaB	Hagerstown silt loam, 2 to 6 percent slopes
HaC	Hagerstown silt loam, 6 to 12 percent slopes
Hu	Huntington silt loam
Kp	Kickapoo fine sandy loam
Lc	Lawrence silt loam
Ld	Lindside silt loam
LwB	Lowell silt loam, 2 to 6 percent slopes
LwC	Lowell silt loam, 6 to 12 percent slopes
LwD	Lowell silt loam, 12 to 20 percent slopes
LyE3	Lowell silty clay loam, 12 to 30 percent slopes, severely eroded
MnC	McAfee silt loam, 6 to 12 percent slopes
MnD	McAfee silt loam, 12 to 20 percent slopes
Mt	Melvin silt loam
MuA	Mercer silt loam, 0 to 2 percent slopes
MuB	Mercer silt loam, 2 to 6 percent slopes
MuC	Mercer silt loam, 6 to 12 percent slopes
MvC3	Mercer silty clay loam, 6 to 12 percent slopes, severely eroded
MwA	Monongahela fine sandy loam, 0 to 2 percent slopes
MwB	Monongahela fine sandy loam, 2 to 6 percent slopes
MwC	Monongahela fine sandy loam, 6 to 12 percent slopes
Ne	Newark silt loam
NhB	Nicholson silt loam, 2 to 6 percent slopes
NhC	Nicholson silt loam, 6 to 12 percent slopes
OtC	Otway silty clay, 6 to 12 percent slopes
OtE	Otway silty clay, 12 to 30 percent slopes
OtF	Otway silty clay, 30 to 50 percent slopes
RaC	Rarden silt loam, 6 to 12 percent slopes
RaD2	Rarden silt loam, 12 to 20 percent slopes, eroded
Rb	Robertsville silt loam
RcC	Rockcastle silt loam, 6 to 12 percent slopes
RcD	Rockcastle silt loam, 12 to 20 percent slopes
RcE	Rockcastle silt loam, 20 to 30 percent slopes
RoE	Rock outcrop-Opequon complex, 12 to 30 percent slopes
Rs	Rock outcrop, shale
ShA	Shelbyville silt loam, 0 to 2 percent slopes
ShB	Shelbyville silt loam, 2 to 6 percent slopes
ShC	Shelbyville silt loam, 6 to 12 percent slopes
SlD	Shelocta gravelly silt loam, 12 to 25 percent slopes
SrC	Shrouts silty clay loam, 6 to 12 percent slopes
SrE	Shrouts silty clay loam, 12 to 30 percent slopes
SuE3	Shrouts clay, 6 to 30 percent slopes, severely eroded
TaB	Tate fine sandy loam, 2 to 6 percent slopes
TaC	Tate fine sandy loam, 6 to 12 percent slopes
TaD2	Tate fine sandy loam, 12 to 20 percent slopes, eroded
TrB	Trappist silt loam, 2 to 6 percent slopes
TrC	Trappist silt loam, 6 to 12 percent slopes
TrD	Trappist silt loam, 12 to 20 percent slopes
TsC3	Trappist silty clay loam, 6 to 12 percent slopes, severely eroded
WeG	Weikert channery silt loam, 40 to 80 percent slopes
WhB	Whitley silt loam, 2 to 6 percent slopes
WhC	Whitley silt loam, 6 to 12 percent slopes
WhD	Whitley silt loam, 12 to 20 percent slopes
WoB	Woolper silty clay loam, 2 to 6 percent slopes
WoC	Woolper silty clay loam, 6 to 12 percent slopes
WpE	Woolper very stony silty clay loam, 12 to 30 percent slopes

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry — FY
- Ford — FORD
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
- Unclassified

Canals and ditches — CANAL

Lakes and ponds
- Perennial — water, w
- Intermittent — int

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions (Large, Small)
- Unclassified

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully

Soil map constructed 1970 by Cartographic Division, Soil Conservation Service, USDA, from 1966 aerial photographs. Controlled mosaic based on Kentucky plane coordinate system, south zone, Lambert conformal conic projection, 1927 North American datum.

MADISON COUNTY, KENTUCKY — SHEET NUMBER 1

(1)

N

2 390 000 FEET

580 000 FEET

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 1

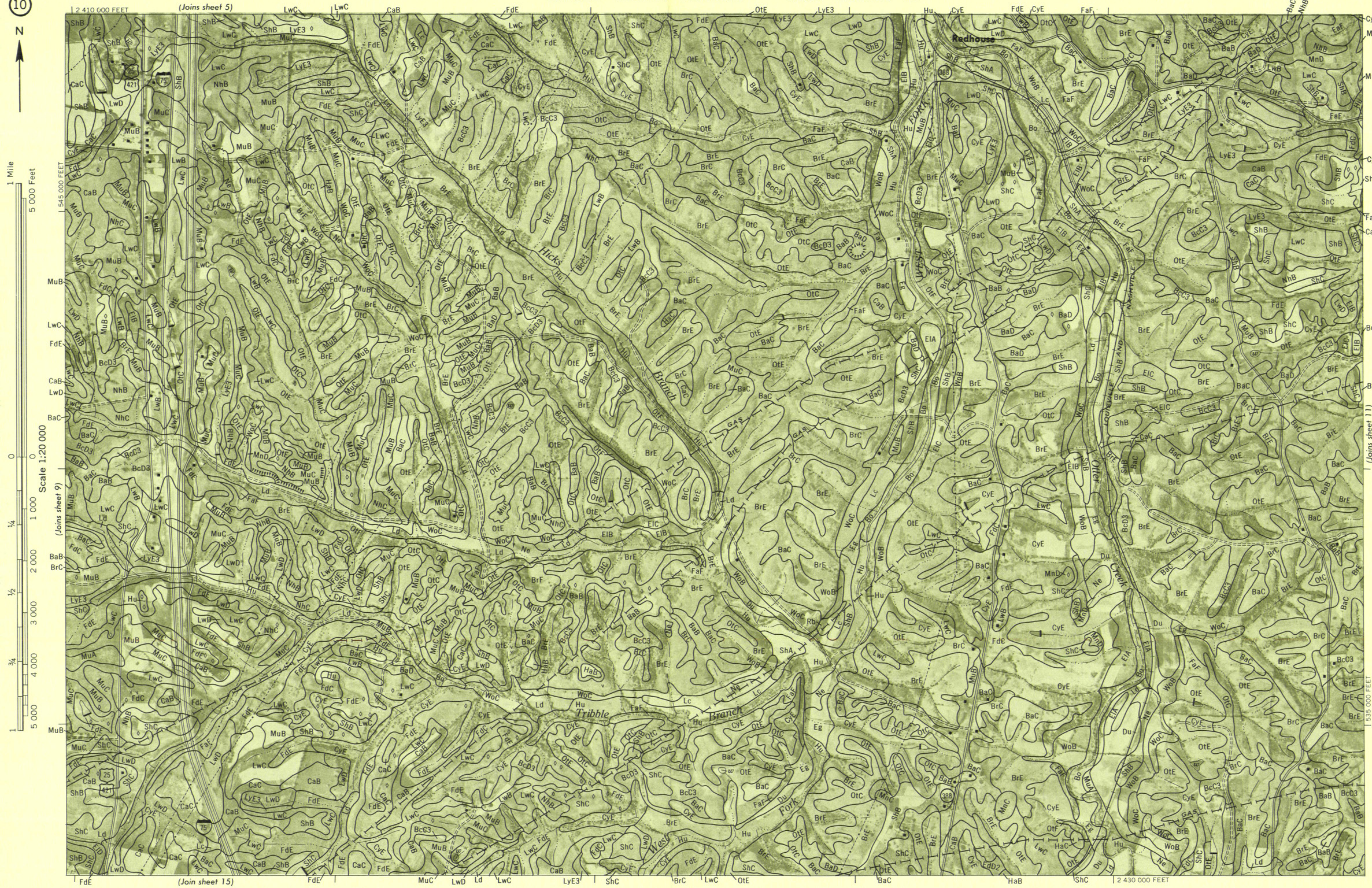
Scale 1:20 000

1 Mile

5 000 Feet

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000



MADISON COUNTY, KENTUCKY NO. 10

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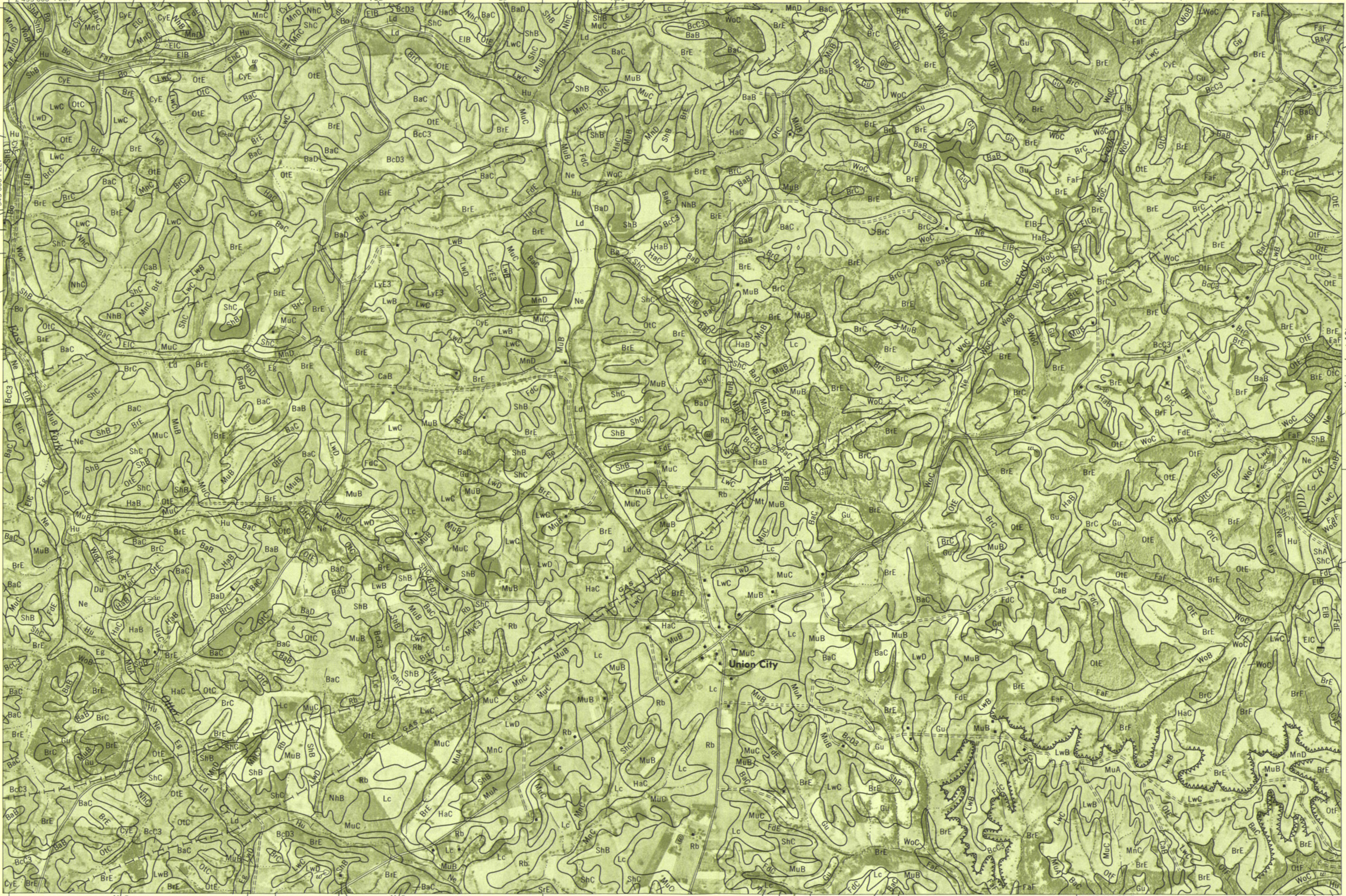
11



N

Scale 1:20 000

1 Mile

5 000 Feet

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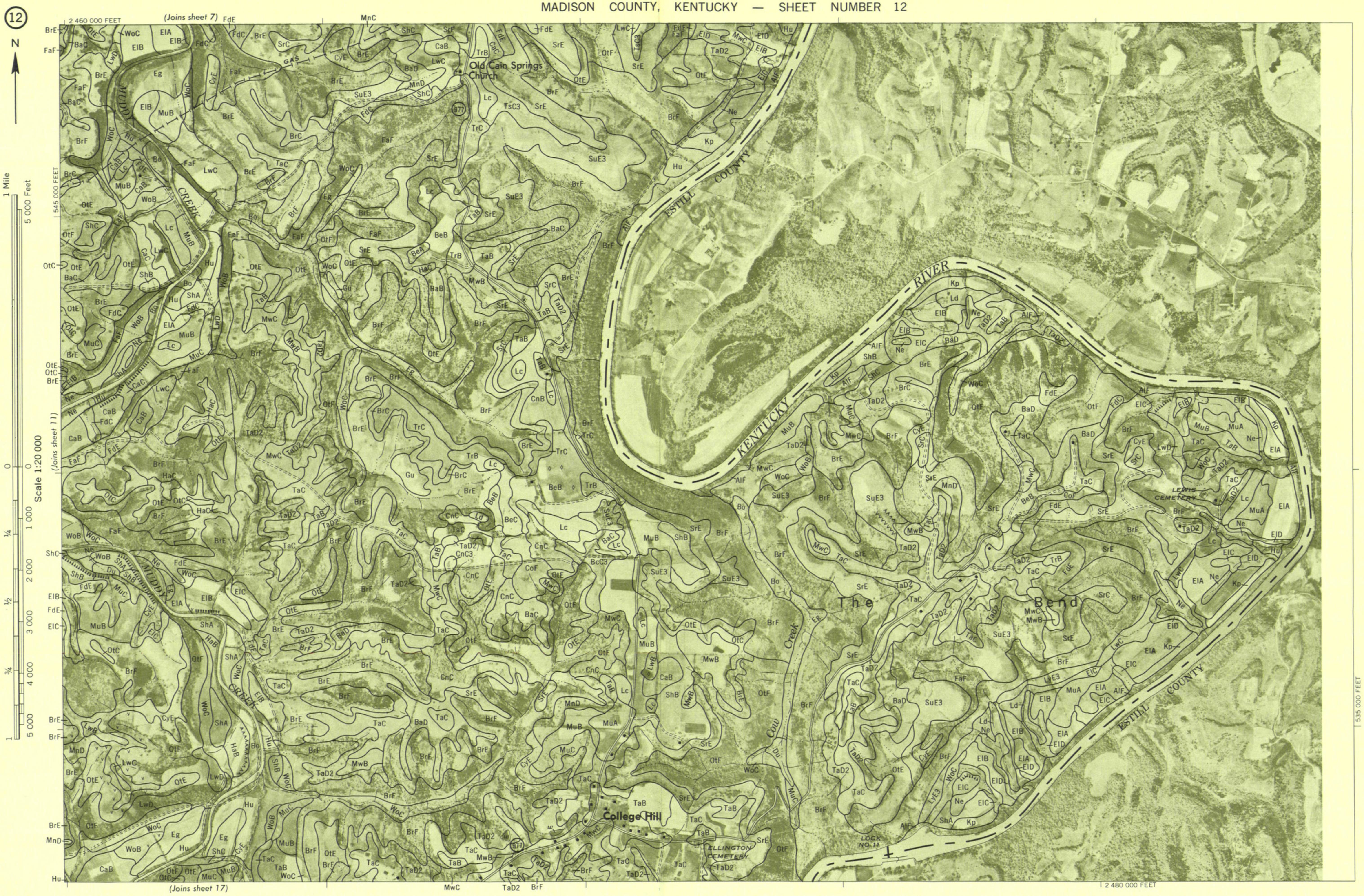
MADISON COUNTY, KENTUCKY NO. 11

MADISON COUNTY, KENTUCKY — SHEET NUMBER 12



MADISON COUNTY, KENTUCKY NO. 12

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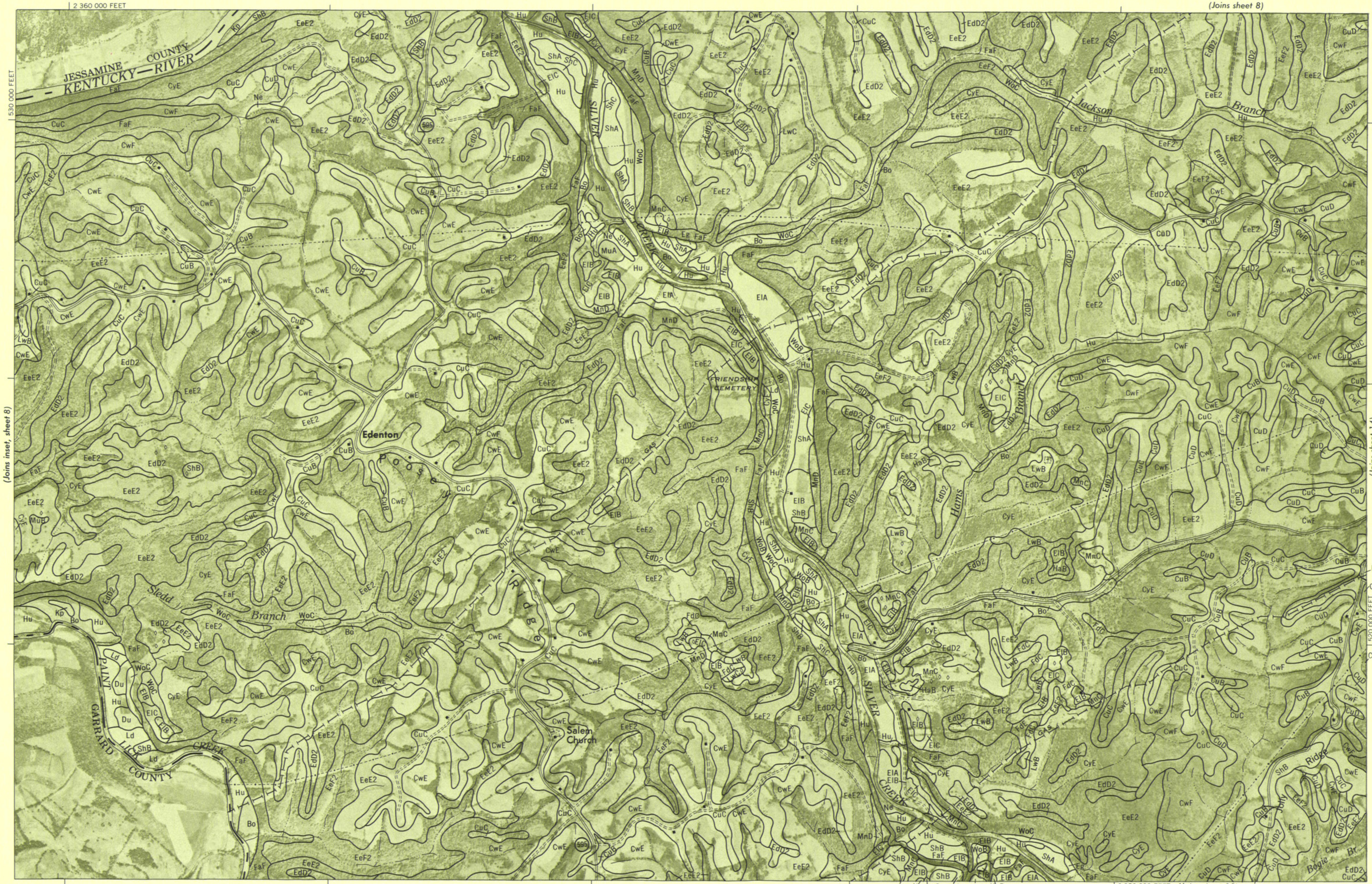

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MADISON COUNTY, KENTUCKY NO. 13

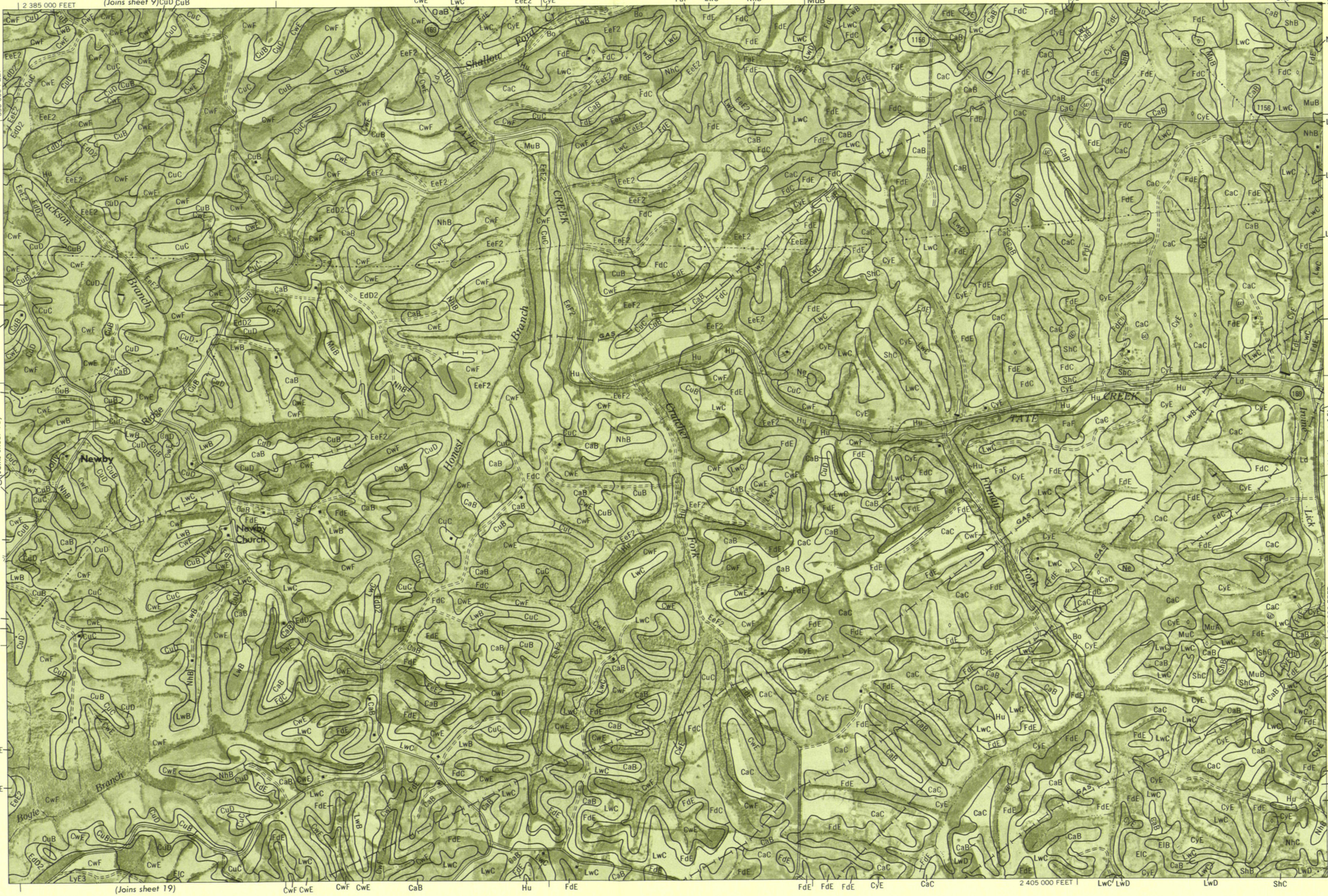
MADISON COUNTY, KENTUCKY — SHEET NUMBER 14

N

(Joins sheet 9)

2 385 000 FEET

530 000 FEET



1 Mile
5 000 Feet
Scale 1:20 000
0 1 000 2 000 3 000 4 000 5 000
0 ¼ ½ ¾ 1

(Joins sheet 19)

MADISON COUNTY, KENTUCKY NO. 14

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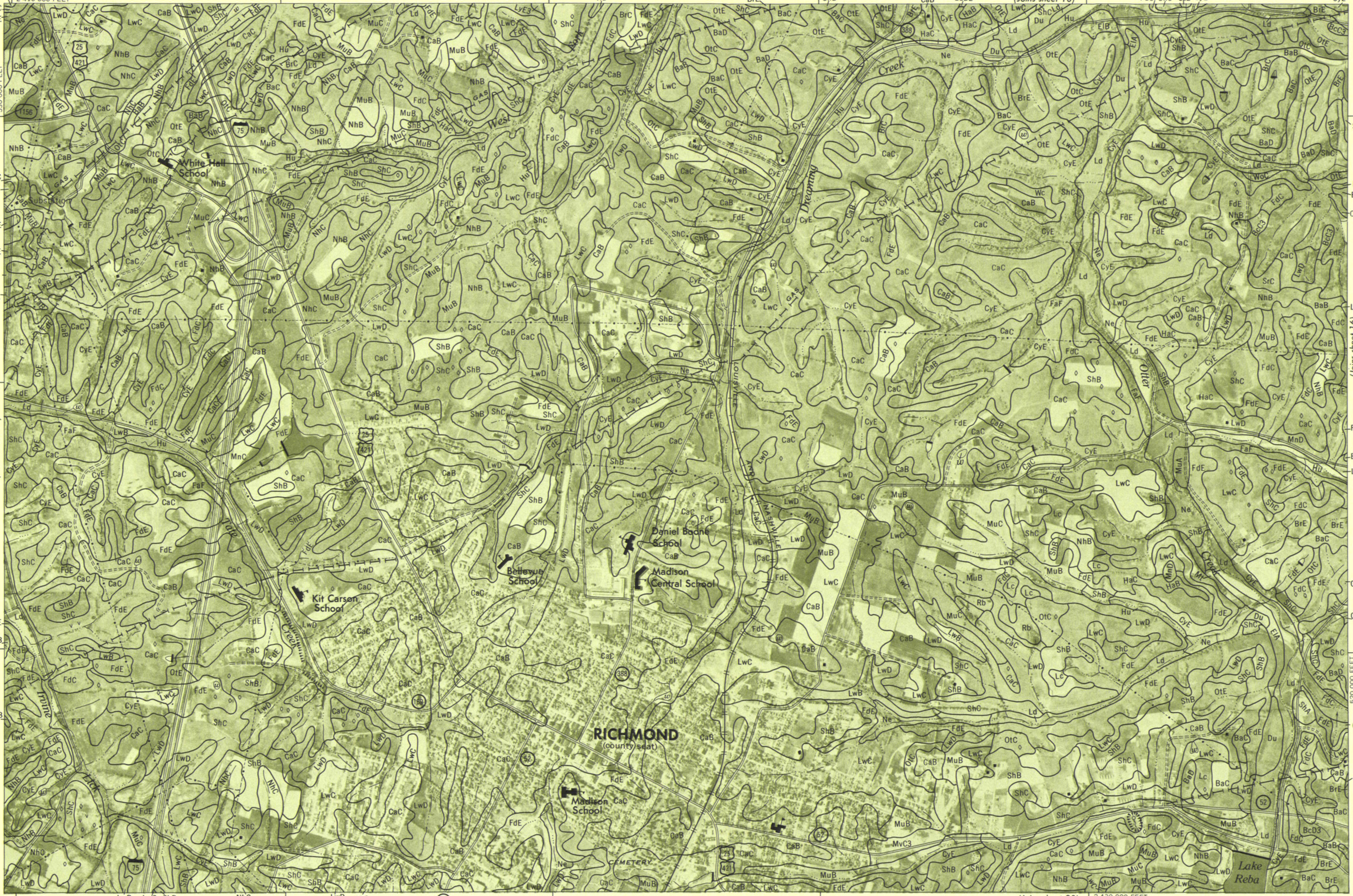

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MADISON COUNTY, KENTUCKY NO. 16

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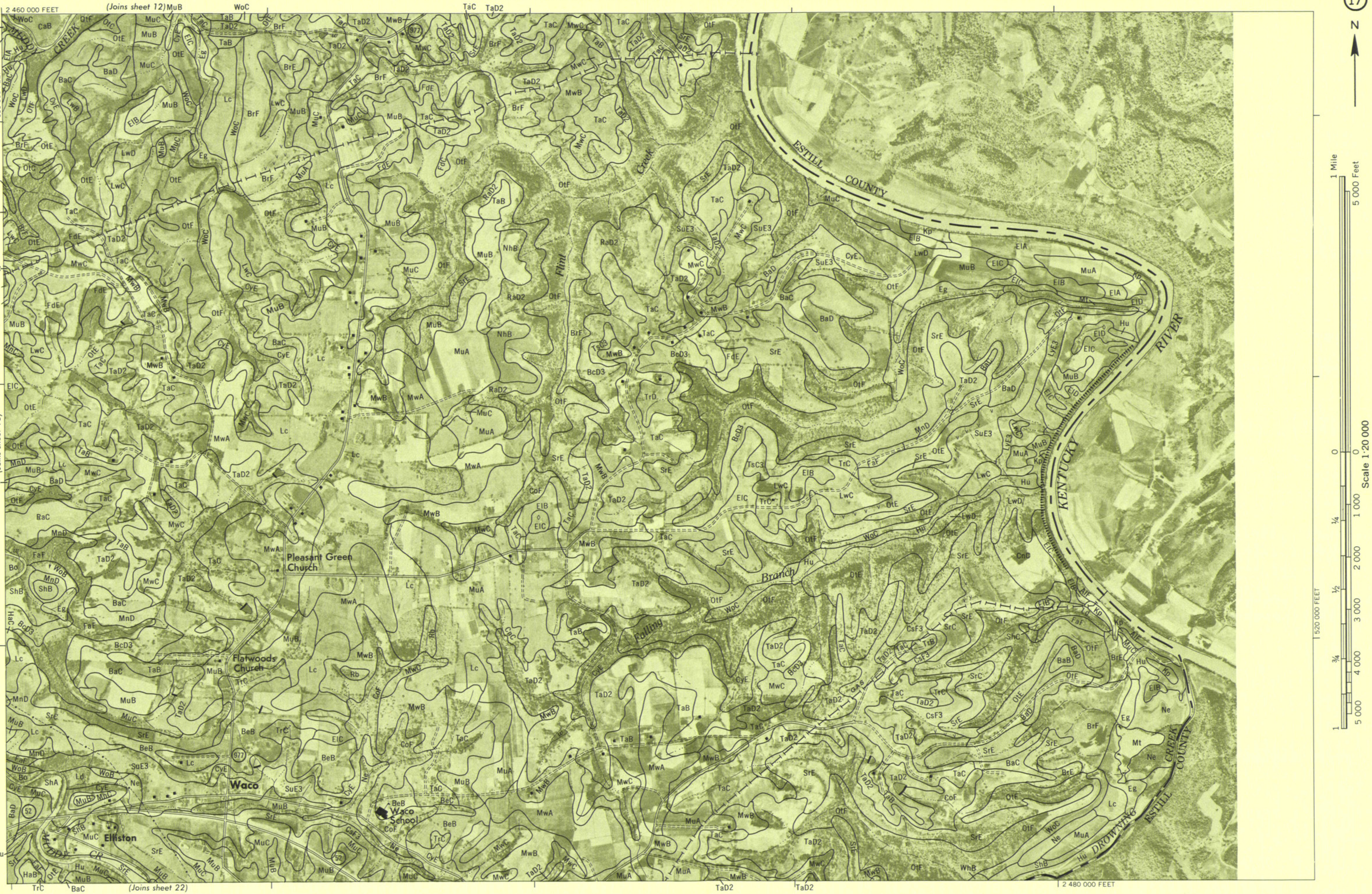
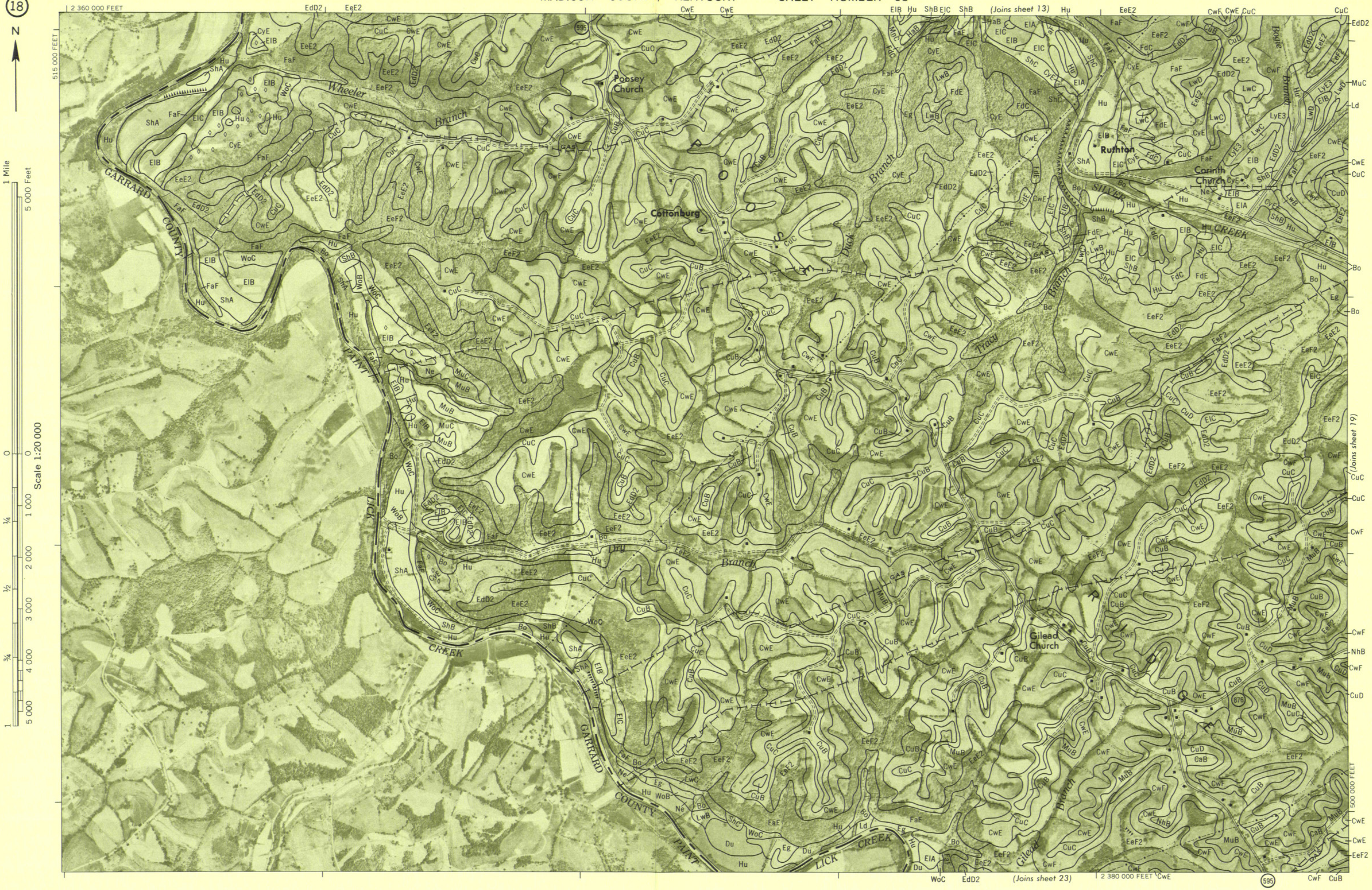
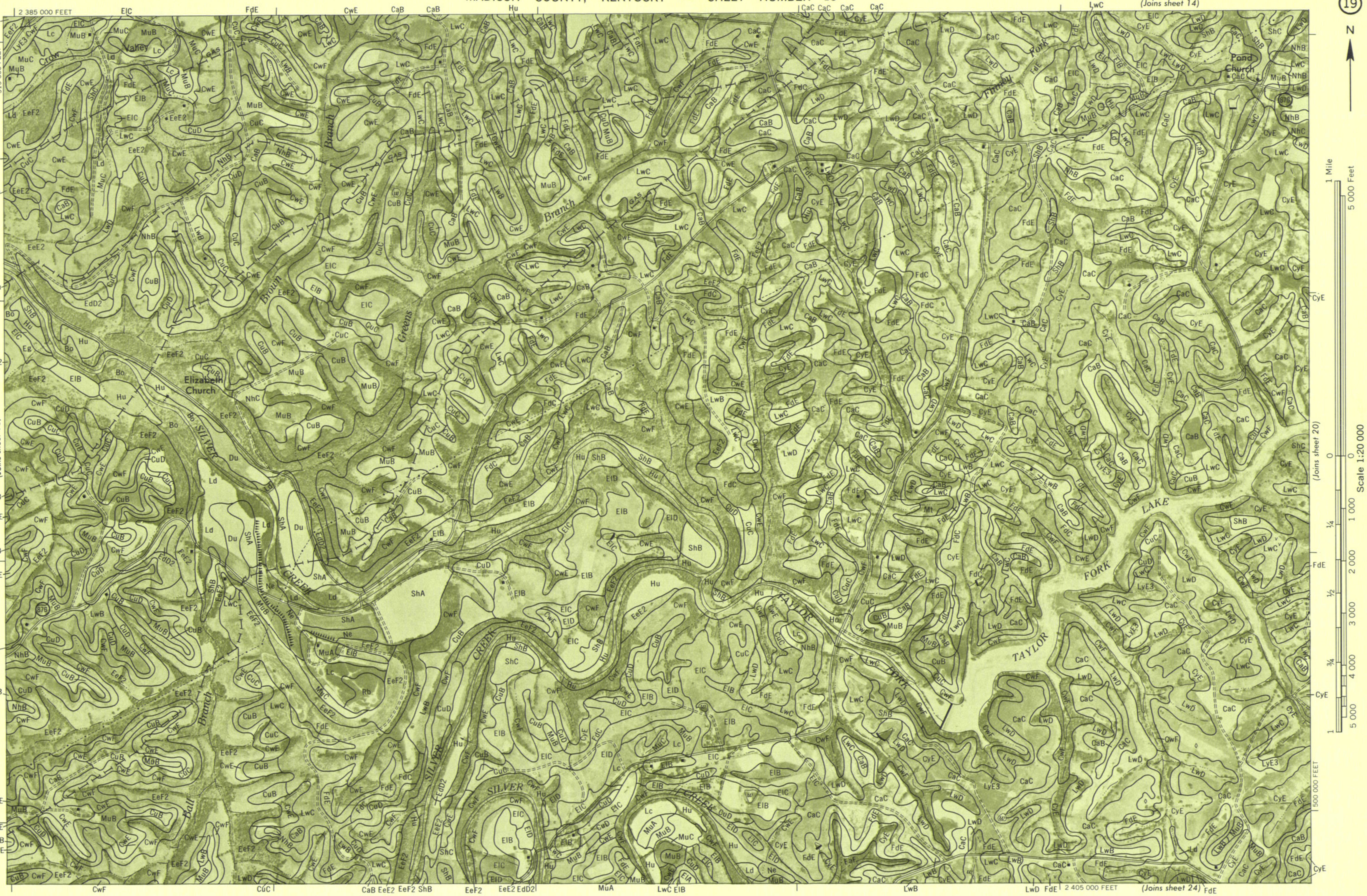
MADISON COUNTY, KENTUCKY NO. 17





MADISON COUNTY, KENTUCKY NO. 18

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.



This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 19

MADISON COUNTY, KENTUCKY — SHEET NUMBER 2

N

1 Mile
5 000 Feet
Scale 1:20 000
0 ¼ ½ ¾ 1
0 1 000 2 000 3 000 4 000 5 000

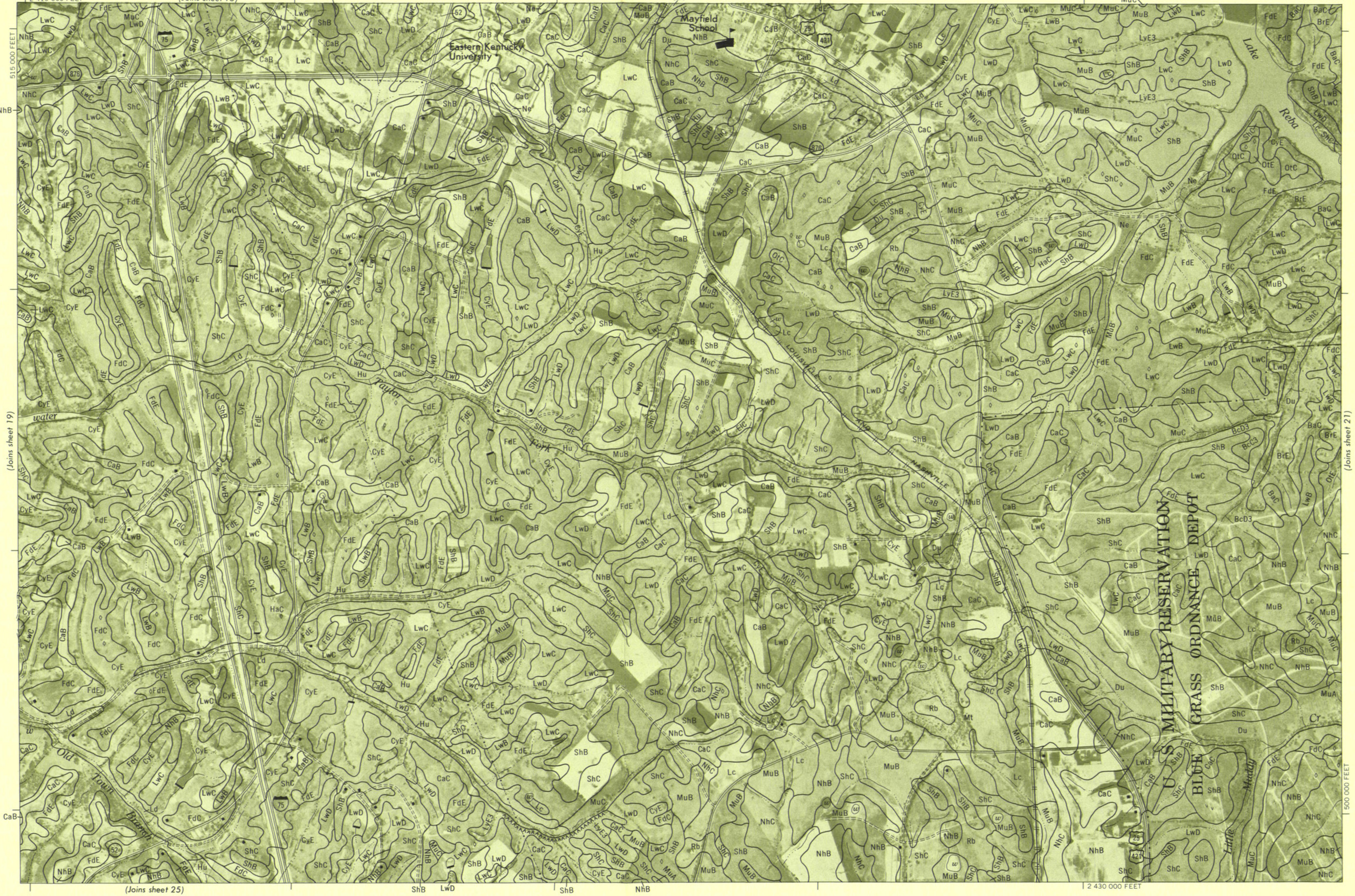
MADISON COUNTY, KENTUCKY NO. 2

Photobase from 1966 aerial photographs. 5,000 foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

MADISON COUNTY, KENTUCKY — SHEET NUMBER 20

(Joins sheet 15)



N

Scale 1:20 000

1 Mile

5 000 Feet

0 | 1 000 | 2 000 | 3 000 | 4 000 | 5 000

¼ | ½ | ¾ | 1

(Joins sheet 19)

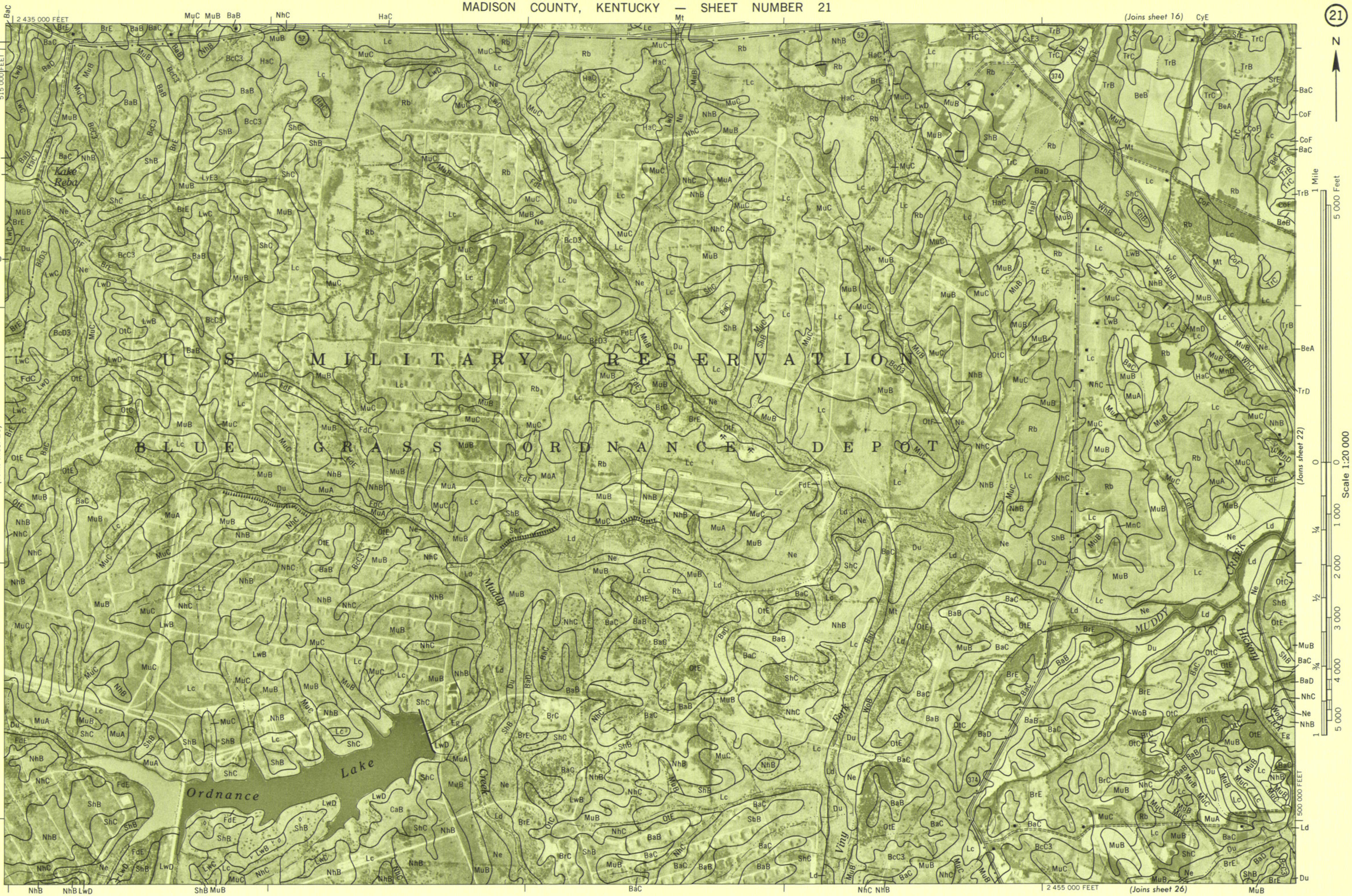
(Joins sheet 21)

(Joins sheet 25)

MADISON COUNTY, KENTUCKY NO. 20

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.



This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 22

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

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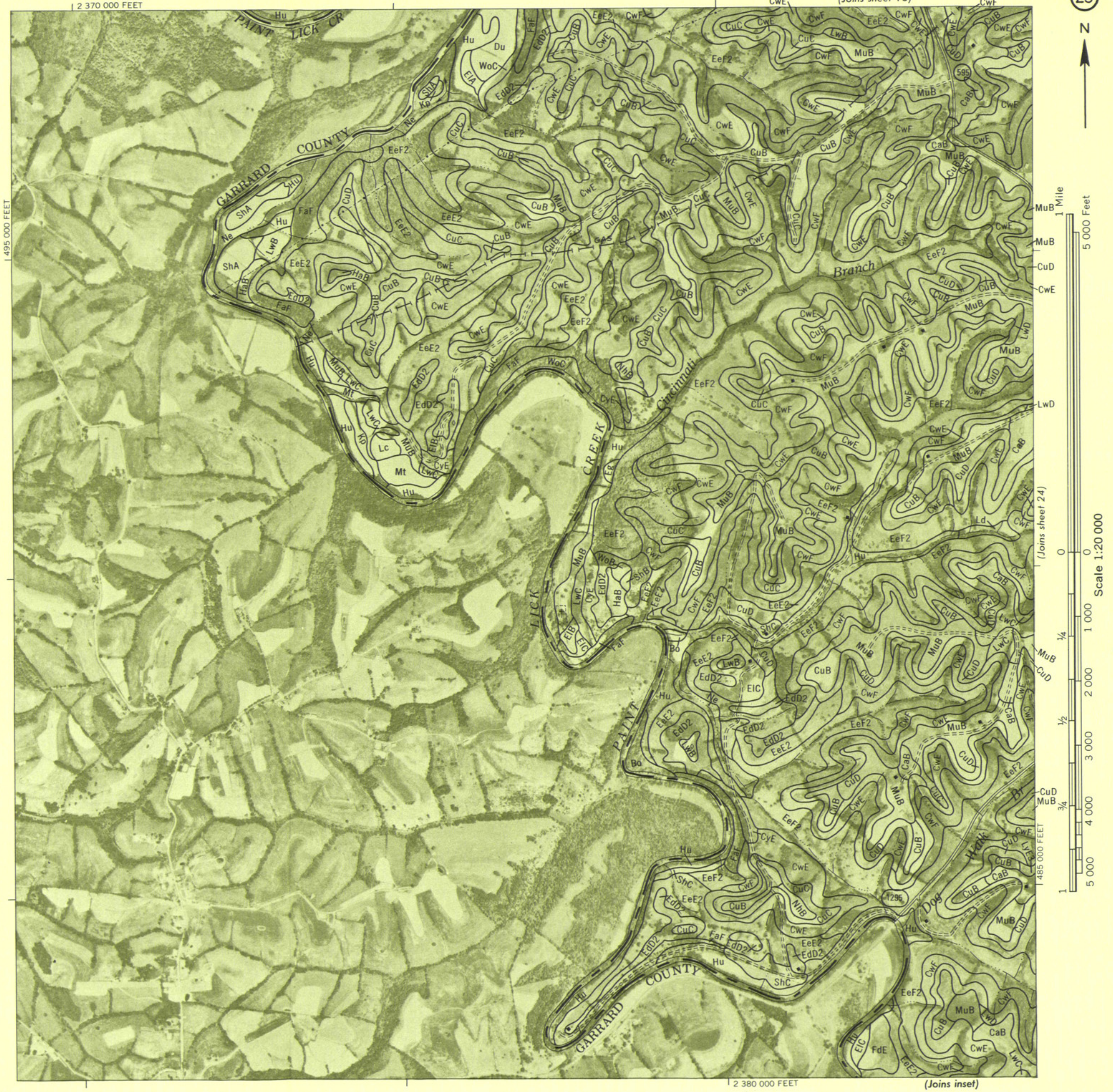
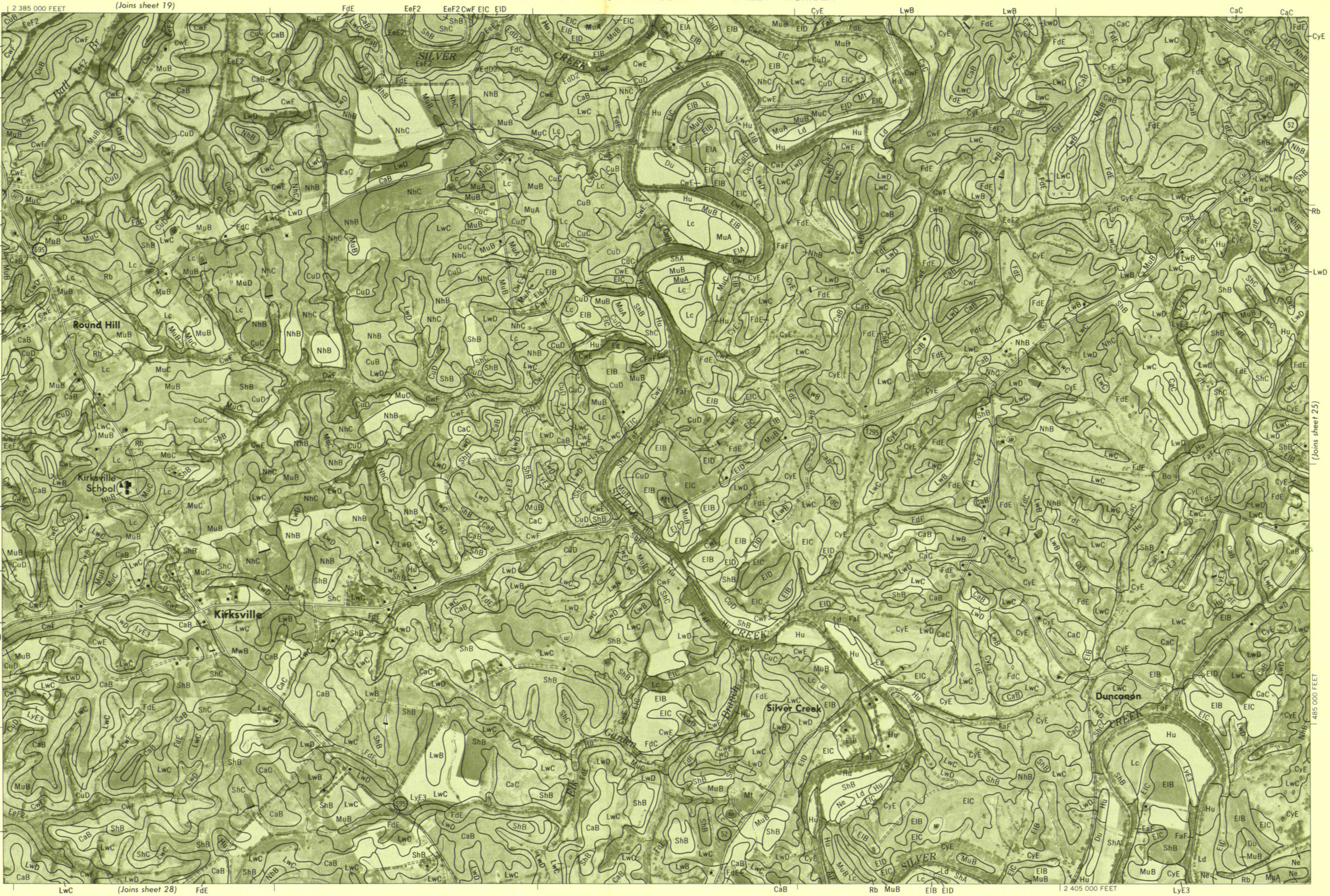
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 23

4000 AND 5000-FOOT GRID TICKS



MADISON COUNTY, KENTUCKY — SHEET NUMBER 24



N

Scale 1:20 000

1 Mile | 0 | 1/4 | 1/2 | 3/4 | 1

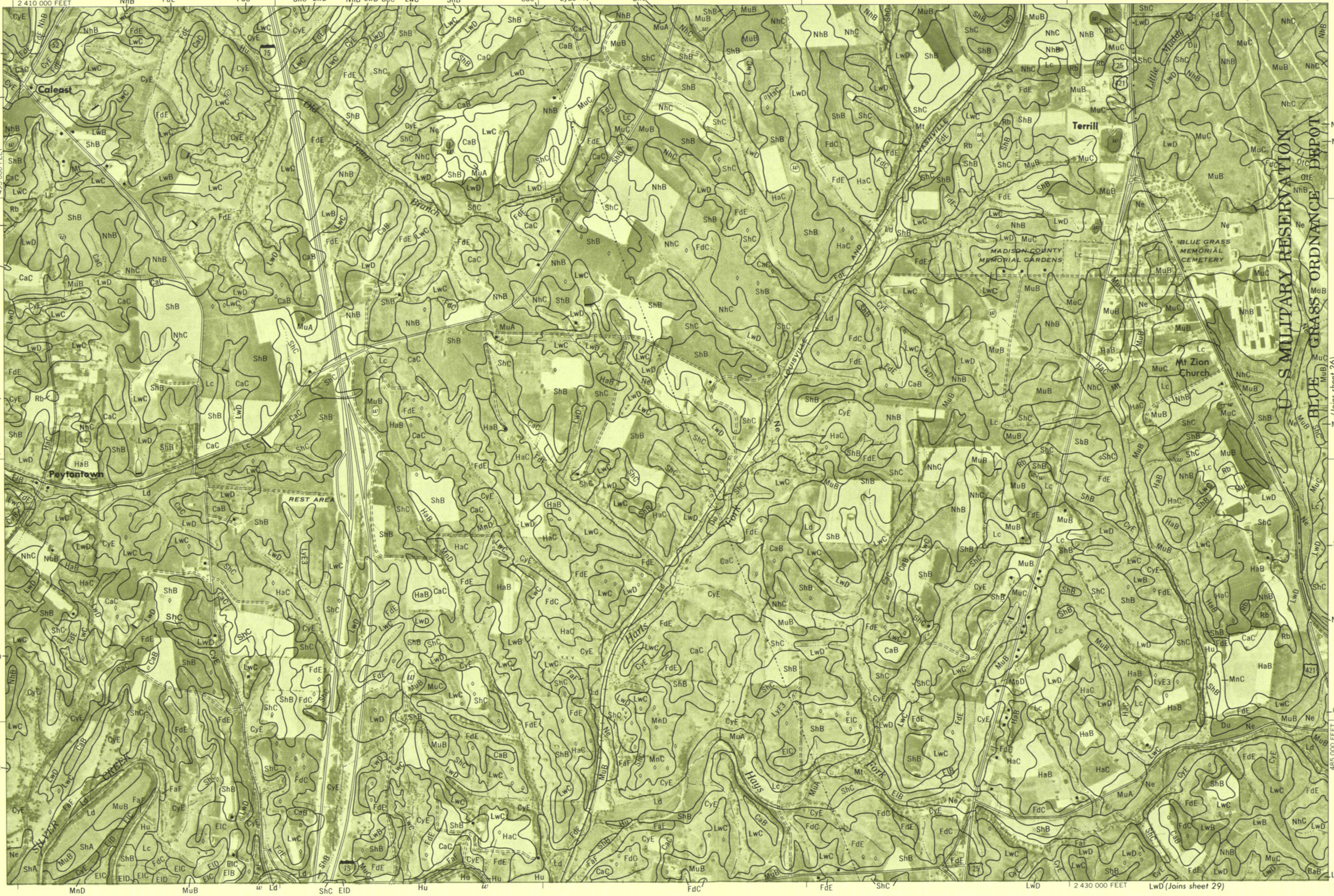
5 000 Feet | 0 | 1 000 | 2 000 | 3 000 | 4 000 | 5 000

MADISON COUNTY, KENTUCKY NO. 24

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

(Joins sheet 20)



(Joins sheet 24)

(Joins sheet 26)

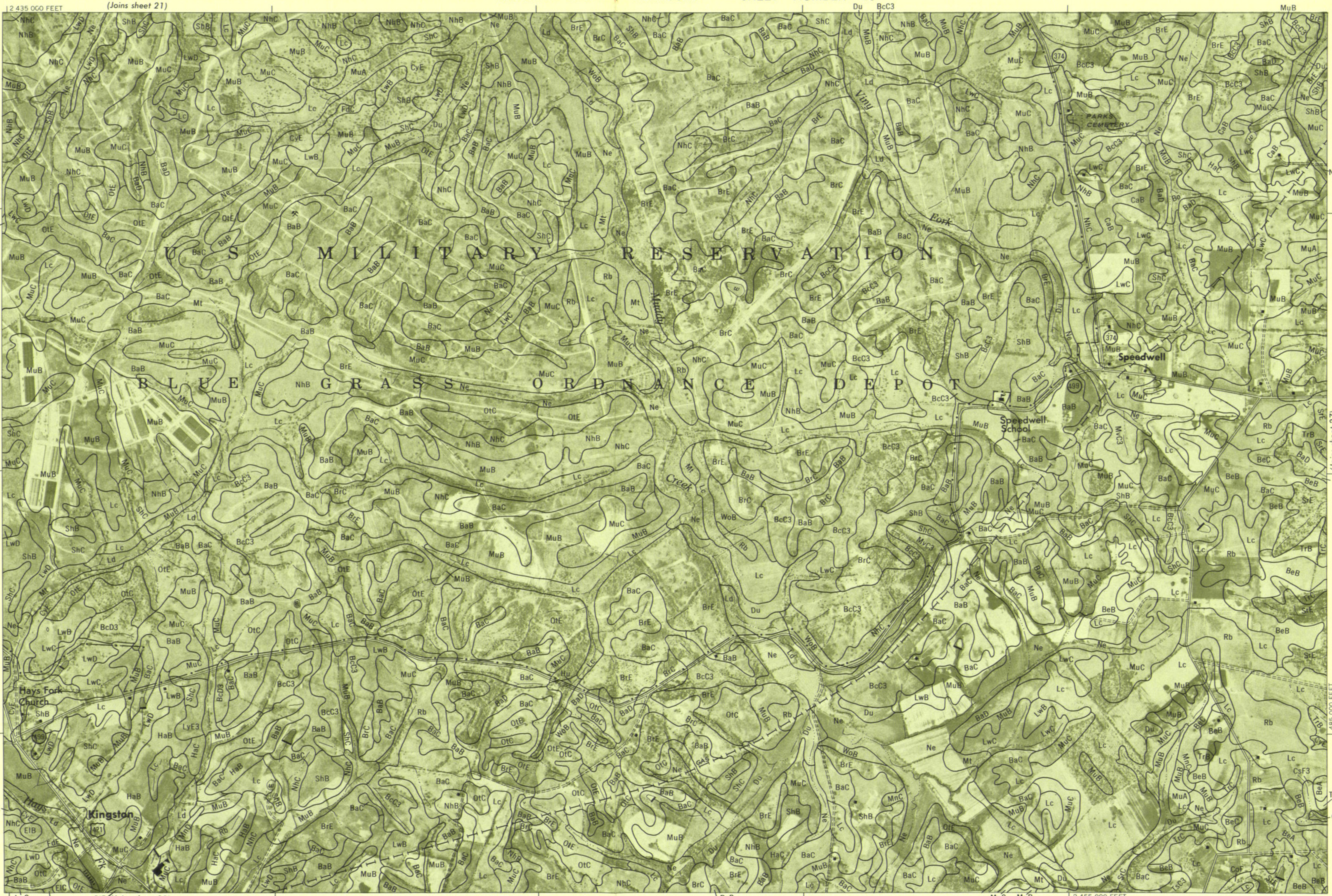
(Joins sheet 29)

MADISON COUNTY, KENTUCKY NO. 25

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY — SHEET NUMBER 26

(Joins sheet 21)



N

Scale 1:20 000

1 Mile — ¾ — ½ — ¼ — 0

5 000 Feet — 4 000 — 3 000 — 2 000 — 1 000 — 0

(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 30)

MADISON COUNTY, KENTUCKY NO. 26

Photobase from 1966 aerial photographs. 5,000 foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

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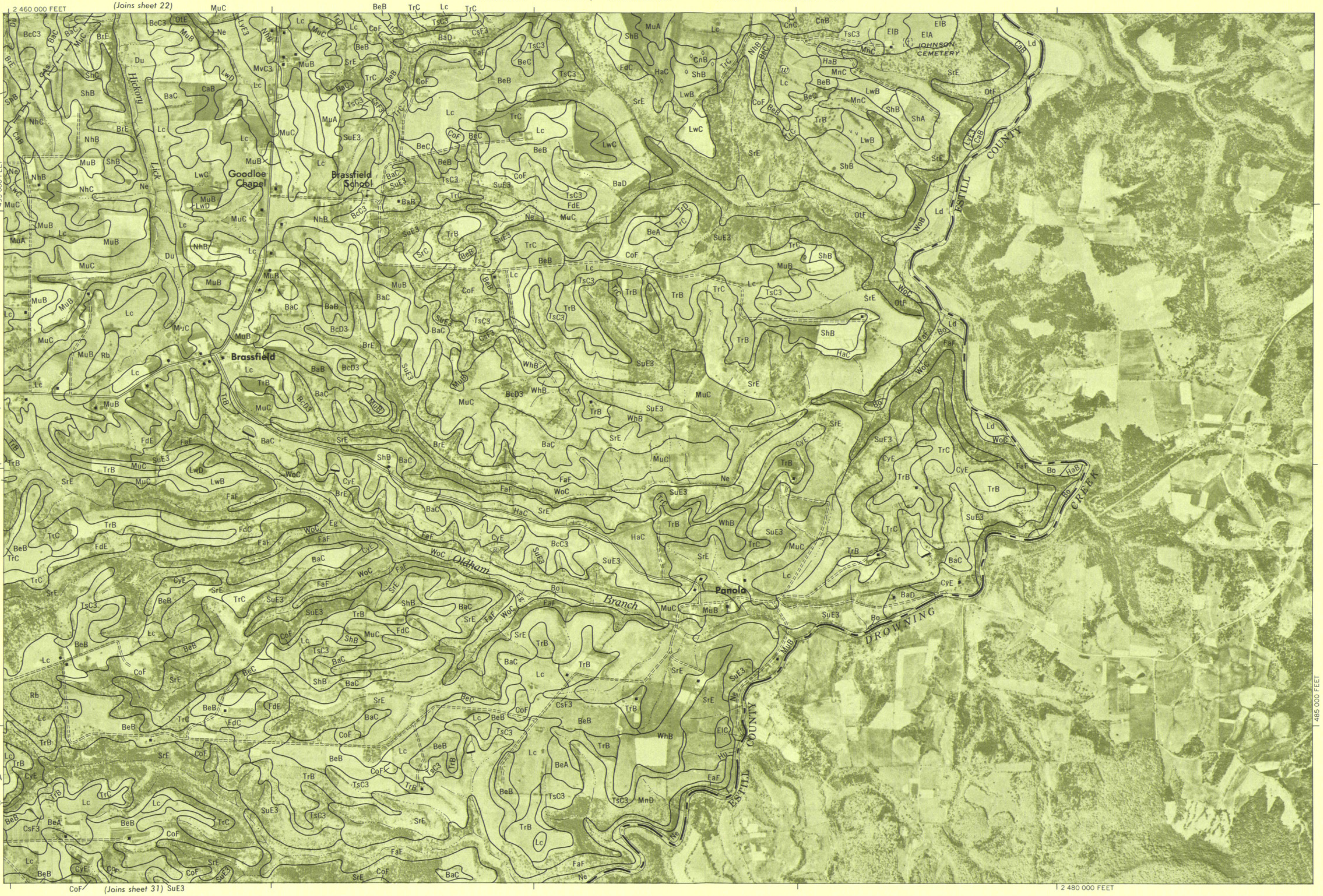
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 27



N

Scale 1:20 000

1 Mile

5 000 Feet

MADISON COUNTY, KENTUCKY — SHEET NUMBER 28

MADISON COUNTY, KENTUCKY NO. 28

Photobase from 1966 aerial photography. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

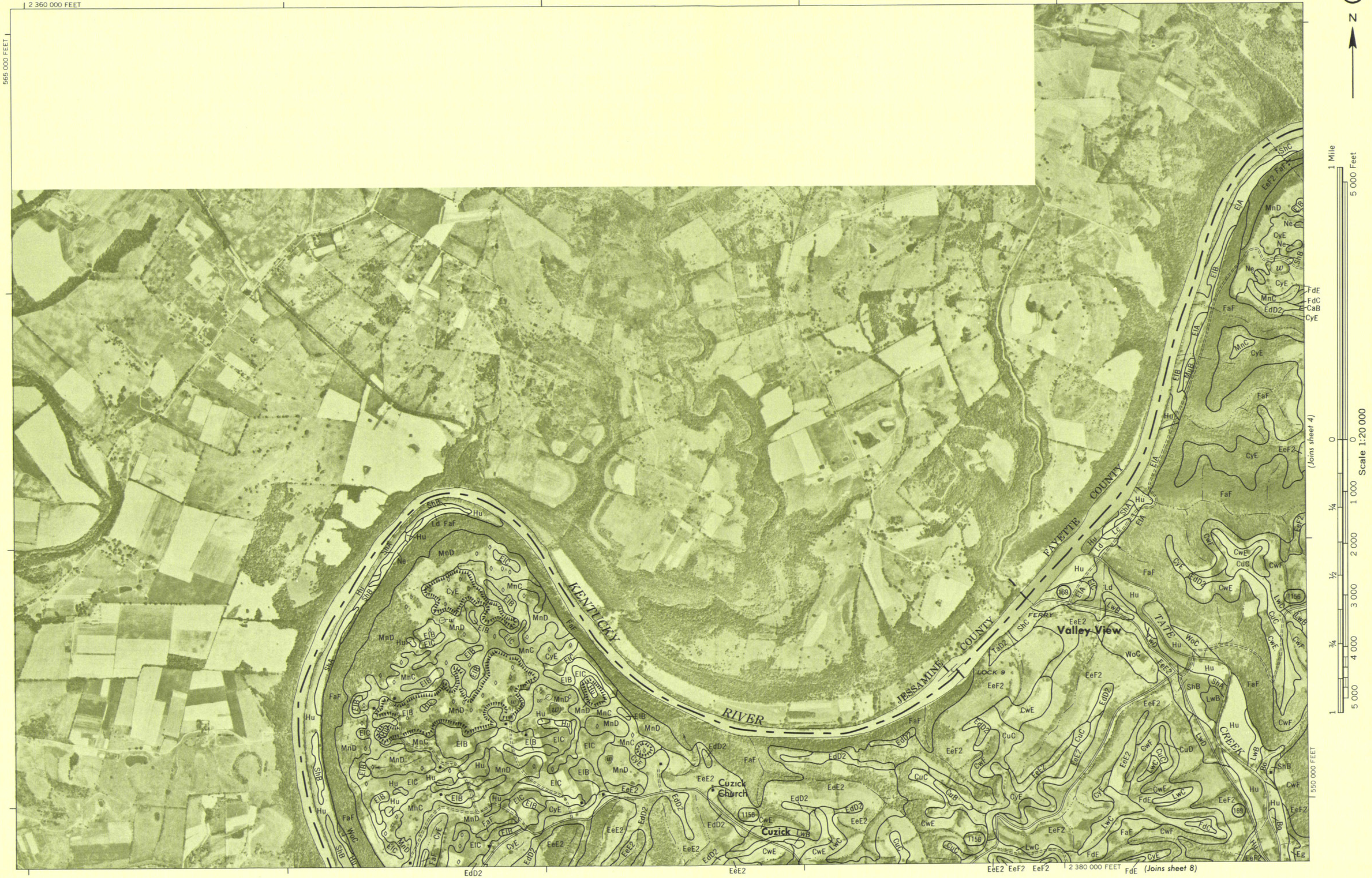
N

1 Mile
5 000 Feet
Scale 1:20 000
0
¼
½
¾
1
1 000
2 000
3 000
4 000
5 000

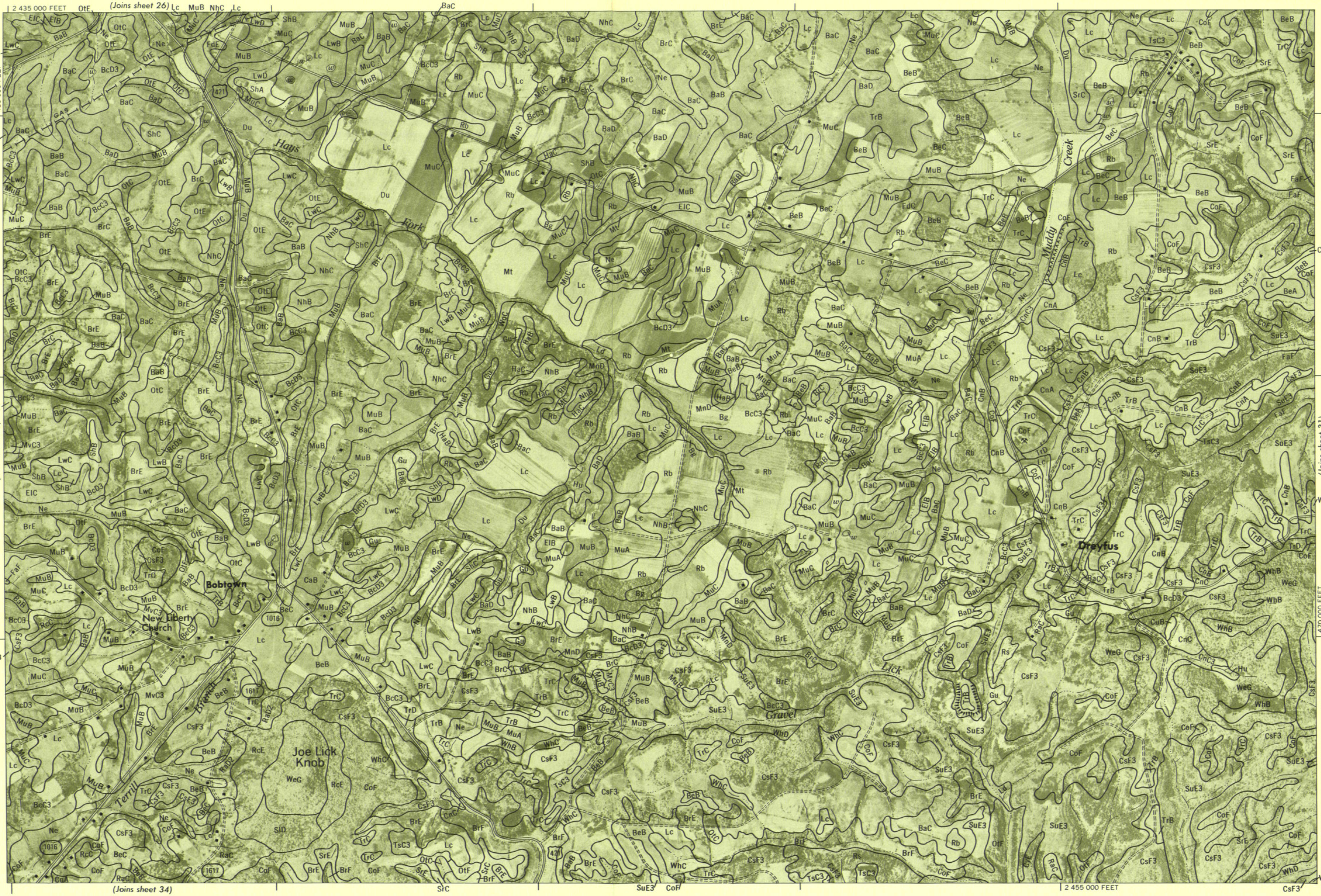
(3)

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 3



30



Scale 1:20 000

1 Mile ¾ ½ ¼ 0

5 000 Feet 4 000 3 000 2 000 1 000 0 5 000

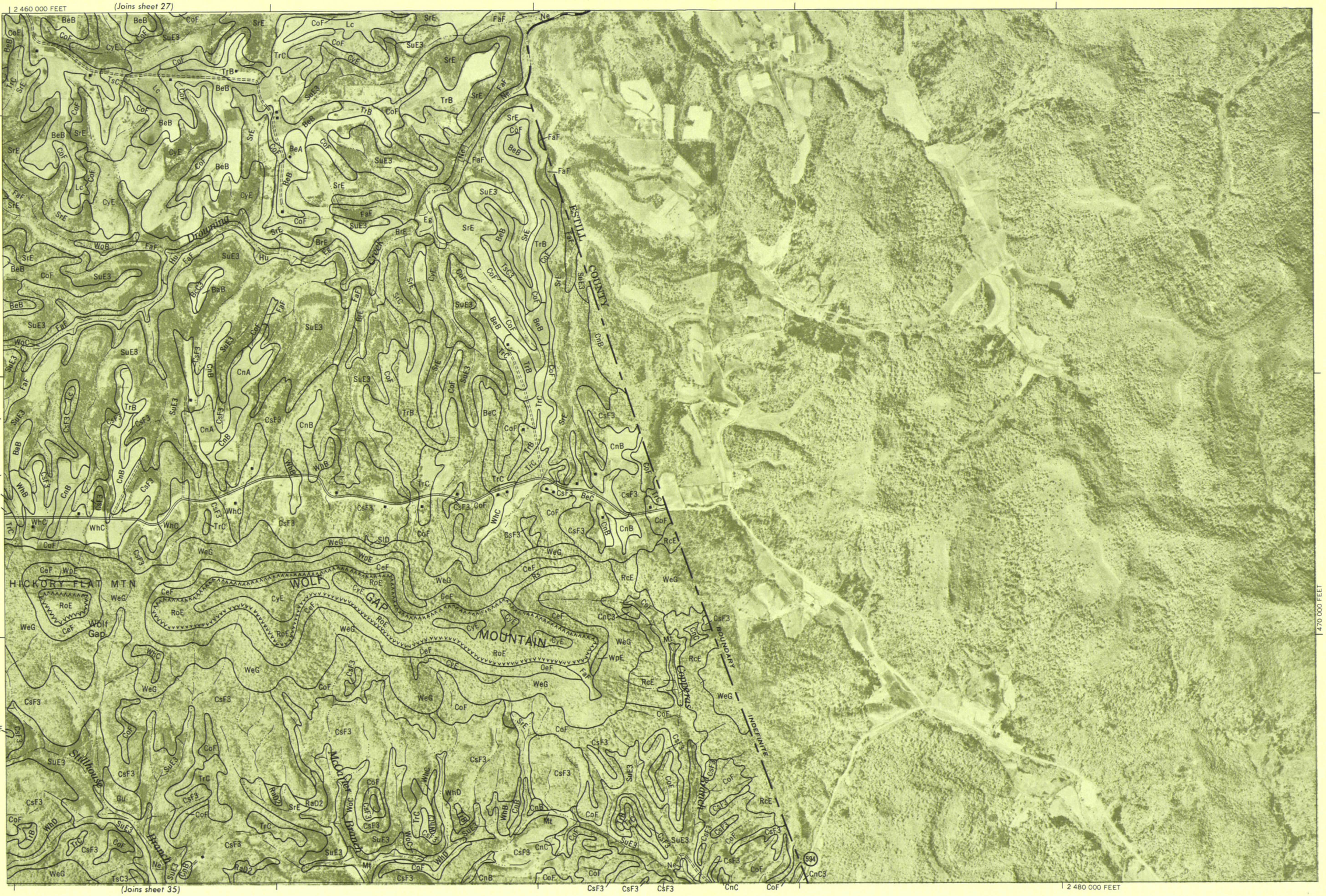
MADISON COUNTY, KENTUCKY NO. 30

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

31

N



Scale 1:20 000

1 Mile

5 000 Feet

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 31

MADISON COUNTY, KENTUCKY NO. 32

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

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Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 33

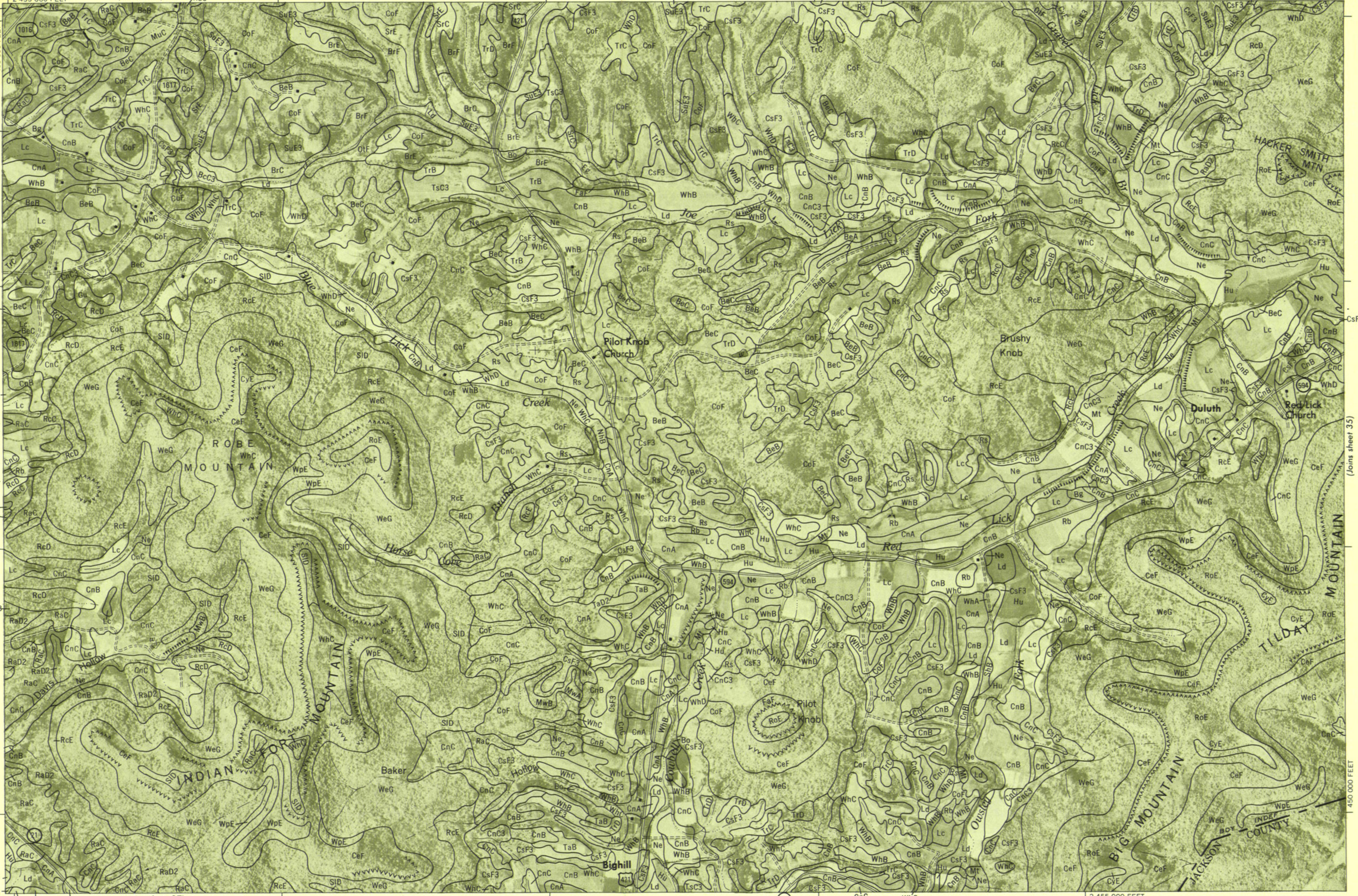
MADISON COUNTY, KENTUCKY — SHEET NUMBER 34

N

2 435 000 FEET

(Joins sheet 30)

465 000 FEET



(Joins sheet 33)

Scale 1:20 000

1 Mile

5 000 Feet

(Joins sheet 35)

450 000 FEET

(Joins sheet 37)

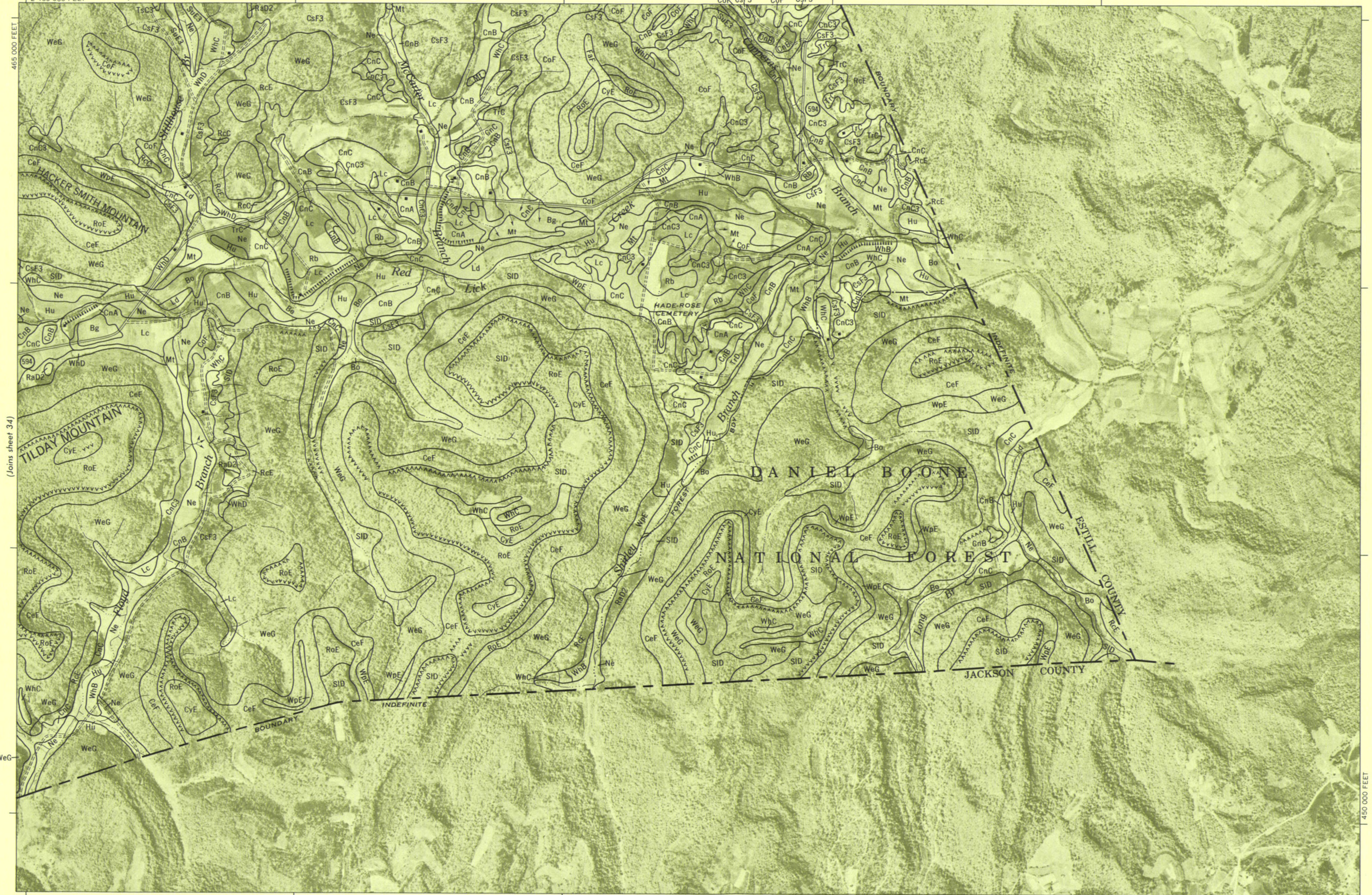
2 455 000 FEET

MADISON COUNTY, KENTUCKY NO. 34

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

35

(Joins sheet 31)



(Joins sheet 34)

N

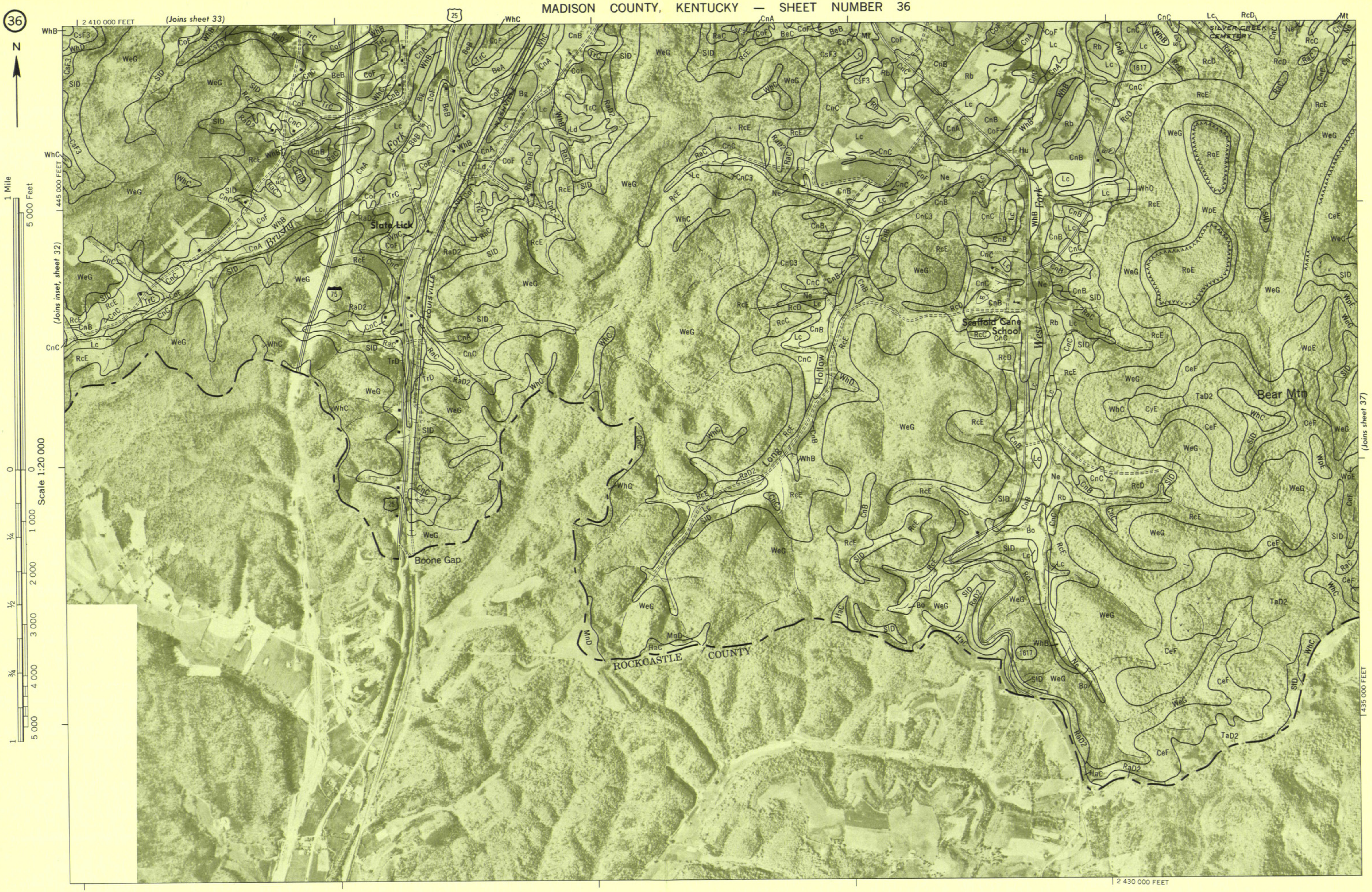
Scale 1:20 000

0 — 1/4 — 1/2 — 3/4 — 1 Mile

0 — 1 000 — 2 000 — 3 000 — 4 000 — 5 000 Feet

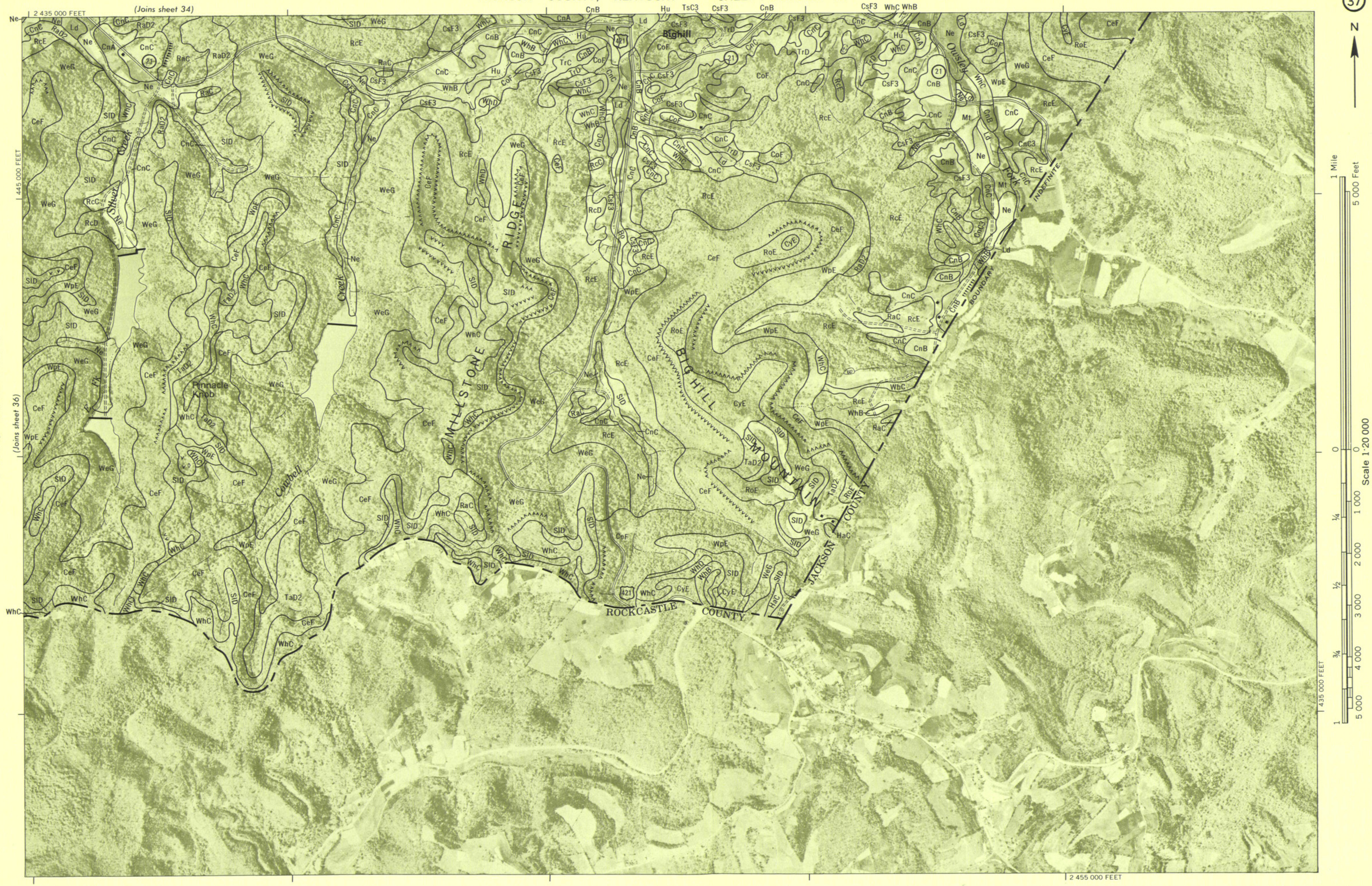
MADISON COUNTY, KENTUCKY NO. 35

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.



MADISON COUNTY, KENTUCKY NO. 36

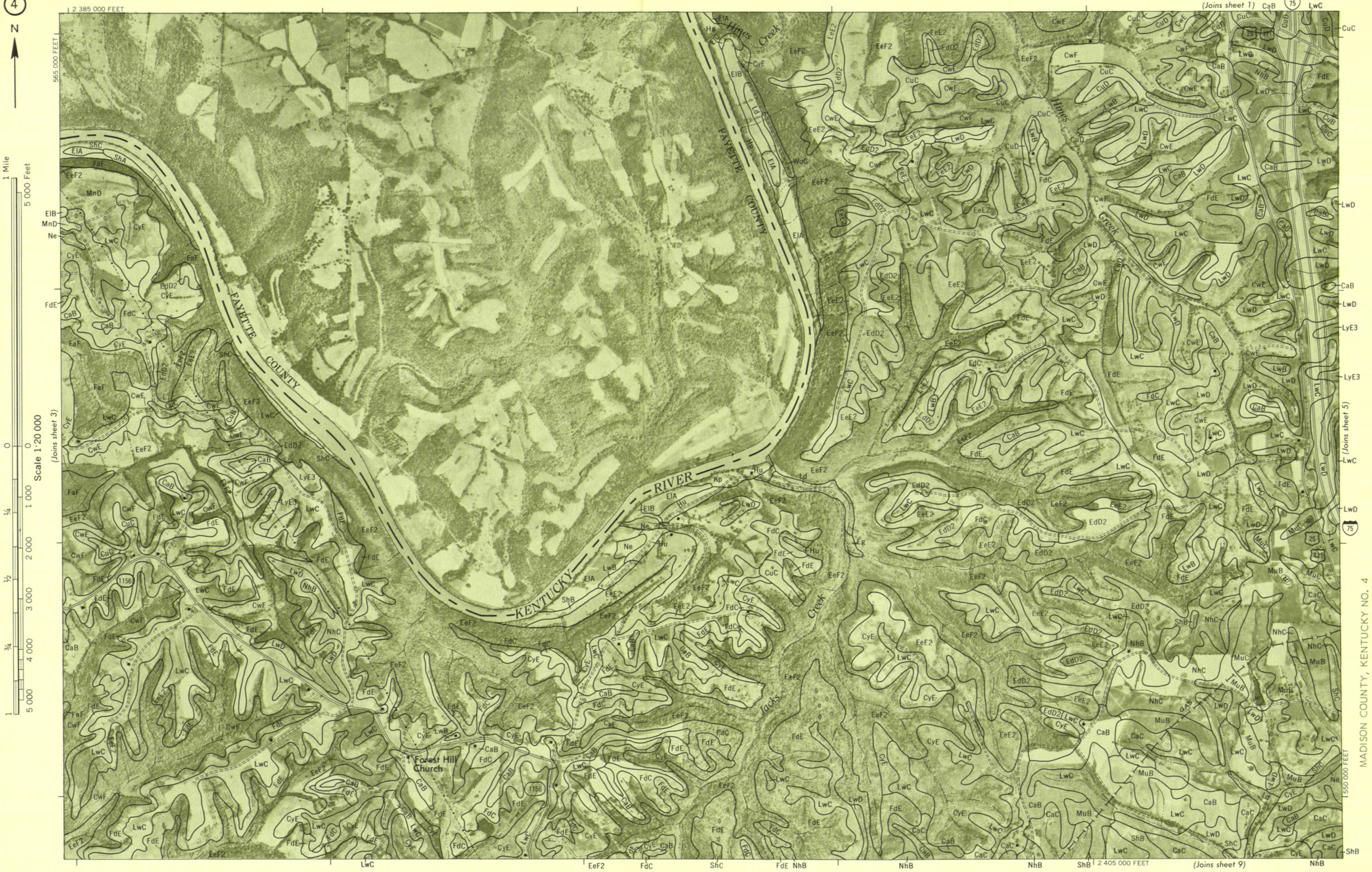
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.



MADISON COUNTY, KENTUCKY NO. 37

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.



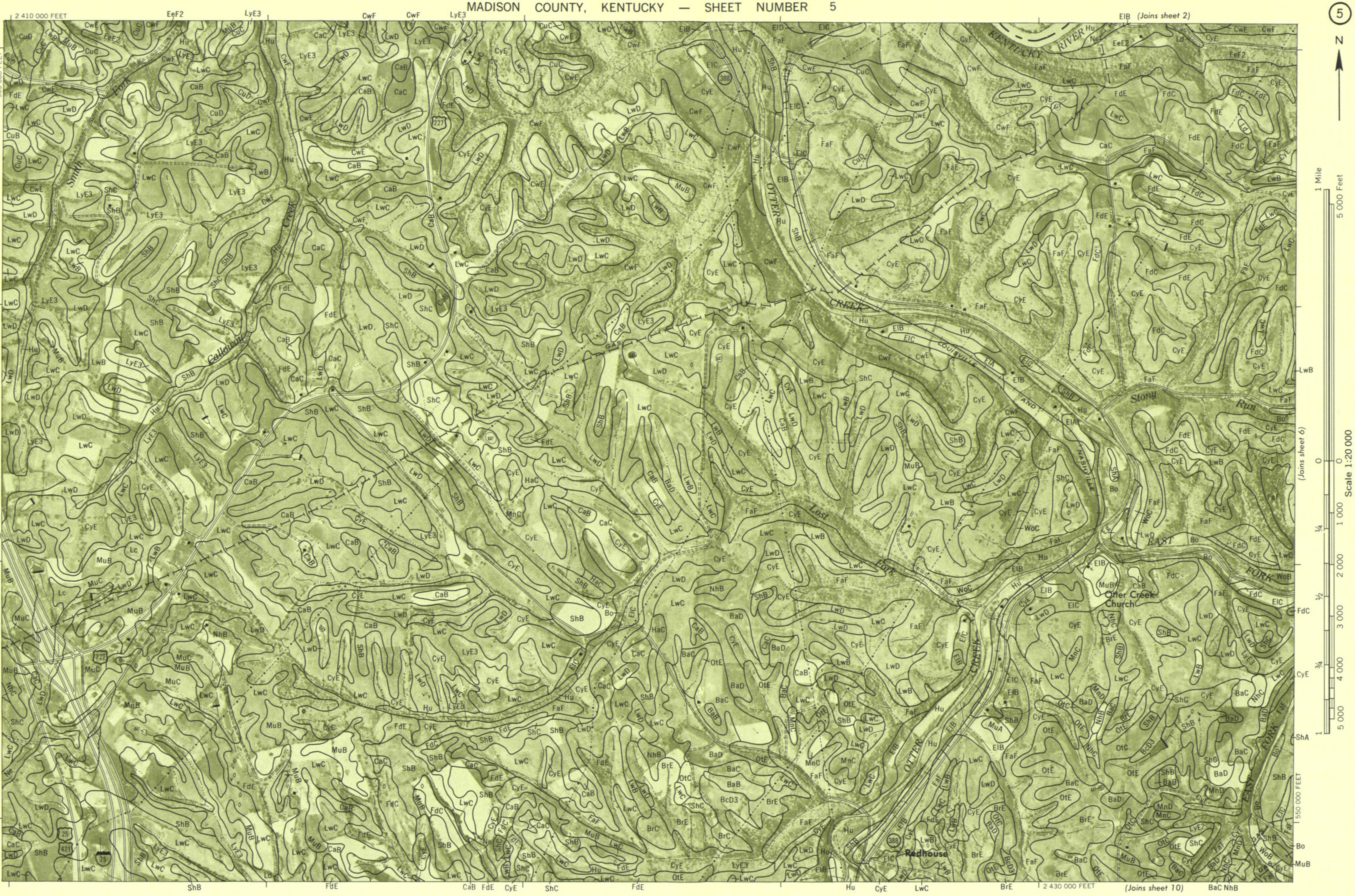
MADISON COUNTY, KENTUCKY NO. 4

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

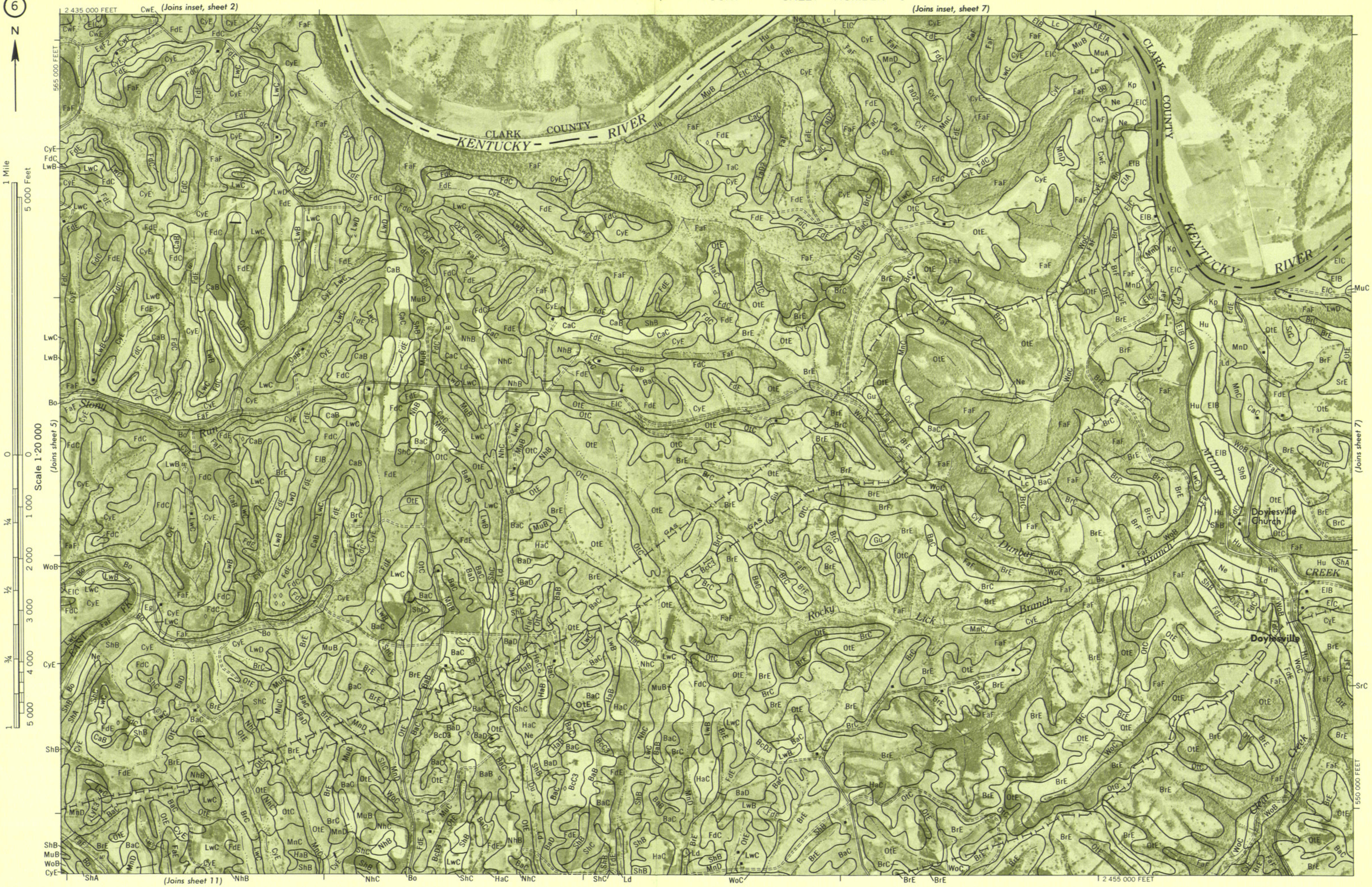
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

5

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.



MADISON COUNTY, KENTUCKY — SHEET NUMBER 6



MADISON COUNTY, KENTUCKY NO. 6

Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

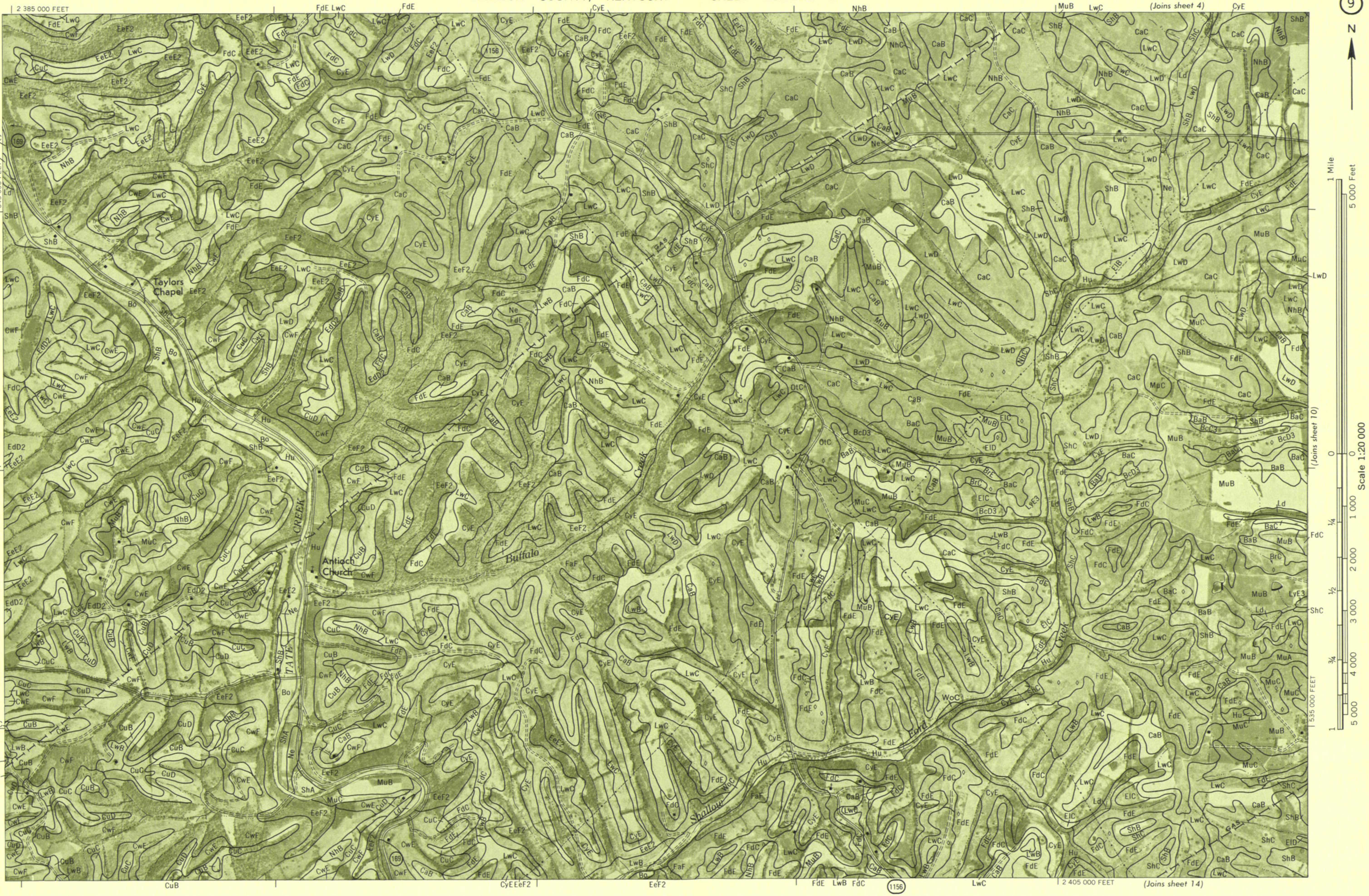
MADISON COUNTY, KENTUCKY — SHEET NUMBER 7

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 7

Photobase from 1966 aerial photographs. 5 000 foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.
This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.

MADISON COUNTY, KENTUCKY — SHEET NUMBER 9



This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1966 aerial photographs. 5,000-foot grid ticks based on Kentucky plane coordinate system, south zone. 1927 North American datum.

MADISON COUNTY, KENTUCKY NO. 9

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 1, page 7.
Estimated yields, table 2, page 46.
Suitability of soils for wildlife habitat, table 3, page 54.
Engineering uses of soils, tables 4 and 5, pages 58 through 73.
Limitations of soils for town and country planning, table 6, page 76.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
AlF	Alluvial land, steep	8	VIe-1	43	13	53
BaB	Beasley silt loam, 2 to 6 percent slopes	8	IIe-2	40	2	50
BaC	Beasley silt loam, 6 to 12 percent slopes	8	IIIe-2	41	2	50
BaD	Beasley silt loam, 12 to 20 percent slopes	8	IVe-2	42	2	50
BcC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	8	IVe-5	42	3	50
BcD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded	9	VIe-2	44	3	50
BeA	Berea silt loam, 0 to 2 percent slopes	9	IIw-1	40	8	52
BeB	Berea silt loam, 2 to 6 percent slopes	9	IIe-3	40	8	52
BeC	Berea silt loam, 6 to 12 percent slopes	10	IIIe-3	41	8	52
Bg	Blago silt loam	10	IIIw-2	41	7	51
Bo	Boonesboro silt loam	11	IIs-1	40	6	51
BrC	Brassfield silt loam, 6 to 12 percent slopes	11	VIe-2	44	5	51
BrE	Brassfield silt loam, 12 to 30 percent slopes	11	VIIe-1	44	5	51
BrF	Brassfield silt loam, 30 to 50 percent slopes	11	VIIe-1	44	5	51
CaB	Caleast silt loam, 2 to 6 percent slopes	12	IIe-2	40	1	50
CaC	Caleast silt loam, 6 to 12 percent slopes	12	IIIe-2	41	1	50
CeF	Caneyville very stony silt loam, 35 to 60 percent slopes	12	VIIs-1	45	2	50
CnA	Captina silt loam, 0 to 2 percent slopes	13	IIw-1	40	8	52
CnB	Captina silt loam, 2 to 6 percent slopes	13	IIe-3	40	8	52
CnC	Captina silt loam, 6 to 12 percent slopes	14	IIIe-3	41	8	52
CnC3	Captina silt loam, 6 to 12 percent slopes, severely eroded	14	IVe-6	42	9	52
CoF	Colyer shaly silt loam, 12 to 50 percent slopes	14	VIIs-1	45	11	52
CsF3	Colyer shaly silty clay loam, 12 to 50 percent slopes, severely eroded	14	VIIs-2	45	5	51
CuB	Culleoka silt loam, 2 to 6 percent slopes	15	IIe-1	39	1	50
CuC	Culleoka silt loam, 6 to 12 percent slopes	15	IIIe-1	40	1	50
CuD	Culleoka silt loam, 12 to 20 percent slopes	15	IVe-1	41	1	50
CwE	Culleoka flaggy silt loam, 20 to 30 percent slopes	15	VIe-1	43	1	50
CwF	Culleoka flaggy silt loam, 30 to 50 percent slopes	15	VIIe-1	44	1	50
CyE	Cynthiana-Rock outcrop complex, 12 to 30 percent slopes	16	VIe-1	43	12	52
Du	Dunning silty clay loam	17	IIIw-2	41	7	51
EdD2	Eden silty clay loam, 6 to 20 percent slopes, eroded	17	IVe-2	42	4	51
EeE2	Eden flaggy clay, 20 to 30 percent slopes, eroded	17	VIe-1	43	4	51
EeF2	Eden flaggy clay, 30 to 50 percent slopes, eroded	17	VIIe-1	44	4	51
Eg	Egam silty clay loam	18	I-2	39	6	51
ElA	Elk silt loam, 0 to 2 percent slopes	19	I-3	39	1	50
ElB	Elk silt loam, 2 to 6 percent slopes	19	IIe-1	39	1	50
ElC	Elk silt loam, 6 to 12 percent slopes	19	IIIe-1	40	1	50
ElD	Elk silt loam, 12 to 20 percent slopes	19	IVe-1	41	1	50
FaF	Fairmount-Rock outcrop complex, 30 to 60 percent slopes	19	VIIe-1	44	12	52
FdC	Faywood silt loam, 6 to 12 percent slopes	20	IIIe-2	41	2	50
FdE	Faywood silt loam, 12 to 30 percent slopes	20	VIe-1	43	2	50
Gu	Gullied land	20	VIIe-2	45	13	53
HaB	Hagerstown silt loam, 2 to 6 percent slopes	21	IIe-1	39	1	50
HaC	Hagerstown silt loam, 6 to 12 percent slopes	21	IIIe-1	40	1	50
Hu	Huntington silt loam	21	I-1	39	6	51
Kp	Kickapoo fine sandy loam	22	I-1	39	6	51
Lc	Lawrence silt loam	22	IIIw-1	41	7	51
Ld	Lindside silt loam	23	I-2	39	6	51
LwB	Lowell silt loam, 2 to 6 percent slopes	23	IIe-2	40	1	50
LwC	Lowell silt loam, 6 to 12 percent slopes	23	IIIe-2	41	1	50
LwD	Lowell silt loam, 12 to 20 percent slopes	23	IVe-2	42	1	50
LyE3	Lowell silty clay loam, 12 to 30 percent slopes, severely eroded	24	VIe-2	44	3	50
MnC	McAfee silt loam, 6 to 12 percent slopes	24	IVe-3	42	2	50
MnD	McAfee silt loam, 12 to 20 percent slopes	24	VIe-1	43	2	50
Mt	Melvin silt loam	25	IIIw-2	41	7	51
MuA	Mercer silt loam, 0 to 2 percent slopes	25	IIw-1	40	8	52
MuB	Mercer silt loam, 2 to 6 percent slopes	26	IIe-3	40	8	52
MuC	Mercer silt loam, 6 to 12 percent slopes	26	IIIe-3	41	8	52
MvC3	Mercer silty clay loam, 6 to 12 percent slopes, severely eroded	26	IVe-6	42	9	52
MwA	Monongahela fine sandy loam, 0 to 2 percent slopes	26	IIw-1	40	8	52
MwB	Monongahela fine sandy loam, 2 to 6 percent slopes	27	IIe-3	40	8	52
MwC	Monongahela fine sandy loam, 6 to 12 percent slopes	27	IIIe-3	41	8	52
Ne	Newark silt loam	27	IIw-2	40	7	52
NhB	Nicholson silt loam, 2 to 6 percent slopes	28	IIe-2	40	1	50
NhC	Nicholson silt loam, 6 to 12 percent slopes	28	IIIe-2	41	1	50
OtC	Otway silty clay, 6 to 12 percent slopes	29	IVe-3	42	4	51
OtE	Otway silty clay, 12 to 30 percent slopes	29	VIe-1	43	4	51
OtF	Otway silty clay, 30 to 50 percent slopes	29	VIIe-1	44	4	51
RaC	Rarden silt loam, 6 to 12 percent slopes	30	IVe-4	42	10	52
RaD2	Rarden silt loam, 12 to 20 percent slopes, eroded	30	VIe-3	44	10	52
Rb	Robertsville silt loam	30	IVw-1	42	7	51
RcC	Rockcastle silt loam, 6 to 12 percent slopes	31	IVe-4	42	4	51
RcD	Rockcastle silt loam, 12 to 20 percent slopes	31	VIe-3	44	4	51
RcE	Rockcastle silt loam, 20 to 30 percent slopes	31	VIIe-1	44	4	51
RoE	Rock outcrop-Opequon complex, 12 to 30 percent slopes	31	VIIIs-1	45	12	52
Rs	Rock outcrop, shale	32	VIIIs-1	45	13	53
ShA	Shelbyville silt loam, 0 to 2 percent slopes	32	I-3	39	1	50
ShB	Shelbyville silt loam, 2 to 6 percent slopes	32	IIe-1	39	1	50
ShC	Shelbyville silt loam, 6 to 12 percent slopes	33	IIIe-1	40	1	50
SlD	Shelocta gravelly silt loam, 12 to 25 percent slopes	33	IVe-1	41	1	50
SrC	Shrouts silty clay loam, 6 to 12 percent slopes	34	IVe-4	42	4	51
SrE	Shrouts silty clay loam, 12 to 30 percent slopes	34	VIe-3	44	4	51
SuE3	Shrouts clay, 6 to 30 percent slopes, severely eroded	34	VIIs-2	45	5	51
TaB	Tate fine sandy loam, 2 to 6 percent slopes	34	IIe-1	39	1	50
TaC	Tate fine sandy loam, 6 to 12 percent slopes	35	IIIe-1	40	1	50
TaD2	Tate fine sandy loam, 12 to 20 percent slopes, eroded	35	IVe-1	41	1	50
TrB	Trappist silt loam, 2 to 6 percent slopes	35	IIe-2	40	10	52
TrC	Trappist silt loam, 6 to 12 percent slopes	35	IVe-3	42	10	52
TrD	Trappist silt loam, 12 to 20 percent slopes	35	VIe-1	43	10	52
TsC3	Trappist silty clay loam, 6 to 12 percent slopes, severely eroded	36	VIe-2	44	3	50
WeG	Weikert channery silt loam, 40 to 80 percent slopes	36	VIIe-1	39	11	52
WhB	Whitley silt loam, 2 to 6 percent slopes	37	IIe-1	39	1	50
WhC	Whitley silt loam, 6 to 12 percent slopes	37	IIIe-1	40	1	50
WhD	Whitley silt loam, 12 to 20 percent slopes	37	IVe-1	41	1	50
WoB	Woolper silty clay loam, 2 to 6 percent slopes	37	IIe-2	40	1	50
WoC	Woolper silty clay loam, 6 to 12 percent slopes	37	IIIe-2	41	1	50
WpE	Woolper very stony silty clay loam, 12 to 30 percent slopes	38	VIe-1	43	1	50

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